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ABSTRACT

The ICTE Tallahassee 2001 conference proceedings is organized into eight themes: "Harnessing the Internet To Raise Educational Standards"; "Policies and Strategies To Evaluate, Identify, and Acquire Effective Software"; "Technology Resources in Support of Learning"; "Distance, Flexible, and Open Learning"; "Creating Digital Assets for Education and the Environment for Their Use"; "Virtual Institutions-Colleges, Universities, and Support Centers"; "Teacher Training"; and "Industry/Education Directions and Cooperative Ventures." Topics include: curriculum planning; intelligent systems; educational technology; Web-based instruction; children's research on the computer; distance learning; Web site resources; online resources to teach grammar; standards for online education service providers; Web based course design; technician and technology education; information technology and disabled students; successful Web site features; software evaluation strategies; research and development; educational software needs; multimedia; data collection devices; computer education; learner-centered instruction; authoring tools instruction; mobile technology based learning; access to technology; learning centers; professional instructional technology; Web course management; matching software and skills; professional development; microcomputer based laboratories; information technology in sports; change management; play therapy; software for evaluating student oral responses; campus intranet system for posting grades; automatic characterization system; wireless local area networks; network printing; educational communities; benefits and problems of Web based courses; active learning; concept maps; computer based models in teacher training; technology based communication; critical learning incidents; global access to e-learning; hybrid online/conventional programs; learning, robotics, and culture; multi-component technology; technology integration; advance organizers; teacher role in distance education; mentoring online; cross-cultural trans-disciplinary learning; student perceptions of instruction; learner clustering; college Web pages; digital multimedia portfolios; programming languages; Webmasters training; a virtual

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university; teachers' electronic portfolios; collaborative learning; self-perceived computer competence; educational technology assessment; technology skills assessment; and university cooperation with neighborhood organizations. (AEF)

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ICTE Tallahassee 2001. International Conference on Technology and Education Proceedings

(19th, Tallahassee, Florida, May 2-5, 2001)

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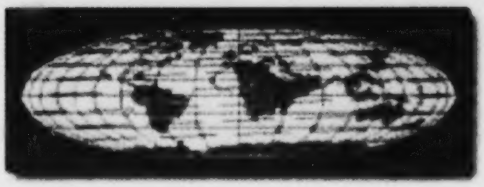

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(Note to *ICTE Tampa 1999 Presenters*: This process, as well as publication of the *ICTE Tampa 1999* printed, bound Proceedings was delayed due to serious and continuing problems with ICTE's Internet Service Provider over the past several months, and the resulting change in June, 2000 to another ISP. Unfortunately, continuing problems with the new ISP, including unsatisfactory service and support, have further contributed to delays. We regret the delays, but in order to make publication of the ICTE Papers both in printed form and on-line on this web site economically feasible, it has been necessary to plan for software utilities and related process for digitization, indexing, and access that we can support on the ISP that we use.

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CURRICULUM PLANNING IN THE TWENTY-FIRST CENTURY: MANAGING TECHNOLOGY, DIVERSITY, AND CONSTRUCTIVISM TO CREATE APPROPRIATE LEARNING ENVIRONMENTS FOR ALL STUDENTS

Walter S. Polka, Ed.D.*
P. Rudy Mattai, Ph.D.°

ABSTRACT

Elementary and secondary curricula at the dawn of the Twenty-First Century are dynamically changing as a result of the following three key educational forces: (A) omnipresent use of evolving technologies, (B) acute focus on the value of diversity and (C) professional emphasis on constructivist principles. (Withrow, 1999 and Brandt, 2000).

Planning effective curricula for schools impacted by those forces in Twenty-First Century America requires that educational planners utilize the proven curriculum planning principles of the past as well as provide for the emerging personal and professional needs of educators. The five personal needs of education, according to contemporary social science research and literature are: ***Challenge***, ***Commitment***, ***Control***, ***Creativity*** and ***Caring*** (Polka, 1997). The six professional needs of educators, according to educational research and literature are: ***Communication***, ***Empowerment***, ***Assistance*** in Decision-making, ***Leadership***, ***Opportunity*** for Professional Growth and ***Time*** (Polka et al., 2000).

The ability to effectively manage the aforementioned three dynamic forces in conjunction with those emerging personal and professional needs is the key curriculum issue confronting educational leaders at the present time.

PRINCIPLES OF CURRICULUM PLANNING

Curriculum planning as a strategic educational process for the improvement of learning first appeared in the educational literature of the post-World War I era (Ornstein & Hunkins, 1988). Since that time, curriculum planners have utilized several different approaches in designing curricula to improve teaching and learning in light of changing societal factors (Hyman, 1973; Brandt, 2000).

However, a curriculum planning framework that has effectively been utilized in the later half of the Twentieth Century to improve teaching and learning is based on the premise that curriculum planning activities should be designed to be C***ooperative***, C***omprehensive***, C***oncrete***, and ***Continuous*** (Krug, 1957). Contemporary educational leaders need to keep those Twentieth Century four C's in mind whenever planning curriculum improvement projects to meet the ever-changing educational landscape of the Twenty-First Century.

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THE PERSONAL AND PROFESSIONAL NEEDS

Contemporary social science research and literature on coping with change has identified five individual needs as significant for organizational and personal satisfaction and productivity in a climate of pervasive change (Polka, 1997). Accordingly, each individual must look at life as a constant ***challenge*** and develop the ability to see change as an opportunity, not a crisis (Csikszentmihaly, 1990). People who are able to cope successfully with significant life changes exhibit a strong ***commitment*** to themselves, their families, and their organizations (Kobasa, 1982). Individuals who believe and act as if they are in ***control*** and can influence the course of events in their particular lives are better prepared for change (Glasser, 1990). People who have the ***creative*** ability to envision optimal experiences are able to cope most effectively with change. (Csikszentmihaly, 1990). However, a ***caring*** family attitude in the work place plays an important role in the effective adjustment to changes (DePree, 1989).

The six professional need areas were initially identified in Twentieth Century curriculum research and literature as: (1) Freedom to teach (***Empowerment***); (2) ***Time*** for Teacher Preplanning; (3) Improved ***Communication*** and Articulation; (4) Instructional ***Leadership***; (5) ***Assistance*** in decision-making areas; and (6) ***Opportunities*** for Professional Growth (Harnack, 1968). The significance of these six professional needs related to effective curriculum planning activities were reconfirmed by subsequent regional (Yuhasz, 1974) and national (Polka, 1977) research studies and are integral components of the contemporary literature and research (Beane et al., 1986), (Brandt, 2000) .

CONTEMPORARY FINDINGS VIS-À-VIS THE NEEDS

Research conducted at Niagara University and Buffalo State College, New York, commencing in 1992, with a sample of two hundred and seventy-nine (279) educators, reconfirmed the significance of the five personal needs and the significance of the six professional needs (Polka, 1994). Most recently (1998), three hundred and twelve (312) educators from two different samples also completed the comprehensive survey instrument. The results of these studies have been fairly constant.

Generally, educators surveyed over the past eight years rank the five personal needs into two broad categories as follows: (A) The personal needs of most importance have consistently been identified as those of ***Control***, ***Creativity***, and ***Caring***; (B) The personal needs of moderate importance have consistently been ***Challenge*** and ***Commitment***. Those same educators ranked the six professional needs into the following three distinct categories: (A) The professional needs of greatest importance have consistently been ***Empowerment*** and ***Time***; (B) The professional needs of considerable importance have consistently been ***Assistance*** and ***Leadership***; (C) The professional needs of moderate importance have consistently been ***Communication*** and ***Opportunity*** for professional growth (Polka, et al., 2000).

However, change in education is a process, not an event, and it is accomplished first by individuals (Hord, et al., 1987). Subsequently, the most effective curriculum changes, or the ones that will yield the most personal and organizational satisfaction and productivity, reflect attention given to the five personal needs of ***Control***, ***Creativity***, ***Caring***, ***Challenge***, and ***Commitment***, as well as the six professional needs of ***Empowerment***, ***Time***, ***Assistance***, ***Leadership***, ***Communication***, and ***Opportunity***. Consequently, curriculum planning projects that address the three contemporary dynamic curriculum change forces of technology, diversity or constructivism, must be introduced to educators with attention given to their personal and professional needs using the ***4 C's*** of ***Cooperative***, ***Comprehensive***, ***Concrete***, and ***Continuous*** as a ***strategic*** framework.

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InterCons – INTELLIGENT INTERNET BASED CONSULTATIVE SYSTEM

Veljko A. Spasiæ[1]

Abstract – INTERNET is offering the mechanism for a global information and knowledge transfer. Effective use of this potential in the field of consultative knowledge transfer, is the subject of this paper. We have developed adaptive, general purpose, INTERNET based, consultative system. System supports consultative learning over the INTERNET. We are now in the phase of INTERNET implementation and testing the various aspects of system performance. One of the application fields is the first Virtual University in Yugoslavia. We named our system InterCons(c).

Key words **– InterCons, InterTrans, MultiMentor, Virtual University, AI, CAL**

INTRODUCTION

Basic idea in the core of **InterCons**, is to simulate consultative process of learning, and to offer it over the INTERNET.

Therefore, **InterCons** - Intelligent Internet Virtual Consultant, fully supports consultative learning. Consultations are based on freely formulated user questions, answers from the **InterCons** knowledge base, and the capability of the Virtual Consultant for a further knowledge acquisition[Spasiæ, 2000b].

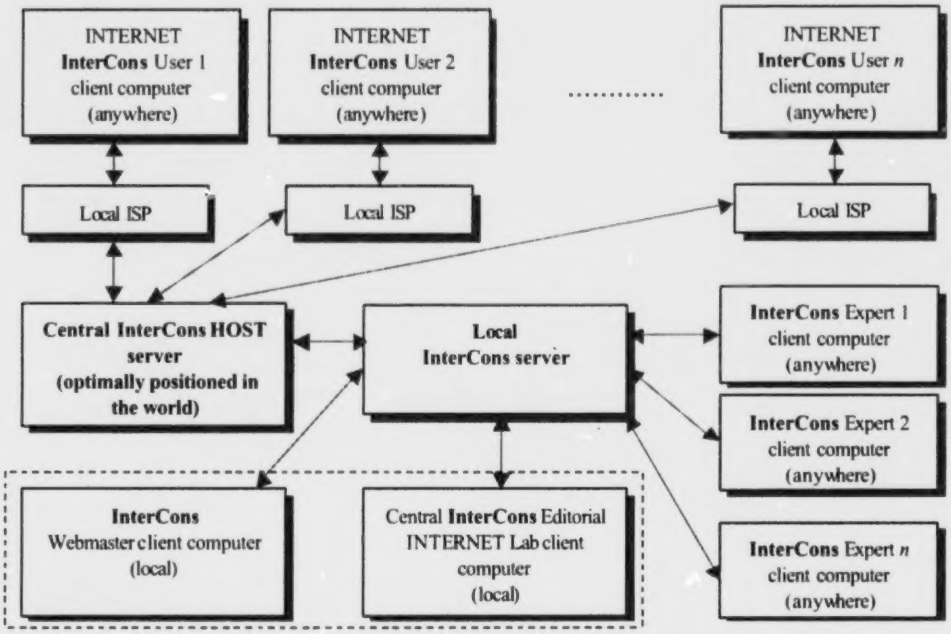
INTERNET
InterCons User 1
client computer
(anywhere)
INTERNET
InterCons User 2
client computer
(anywhere)
....
INTERNET
InterCons User *n*
client computer
(anywhere)
Local ISP
Local ISP
Local ISP
Central InterCons HOST server (optimally positioned in the world)
Local InterCons server
InterCons Expert 1
client computer
(anywhere)
InterCons Expert 2
client computer
(anywhere)
InterCons Webmaster client computer (local)
Central InterCons Editorial INTERNET Lab client computer (local)
InterCons Expert *n*
client computer
(anywhere)

Figure 1. – InterCons system structure and information flow

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InterCons(c)

In development phase of the **InterCons** for the particular subject, college course, etc., there are three main steps:

- initial construction of the **InterCons** subject knowledge base, using knowledge engineering techniques;
- *entrainment* phase, where simulated users and the real expert(s) use the system which acquires the knowledge during the entrainment communication;
- continuos "convergent" **InterCons** learning according to the user requirements.

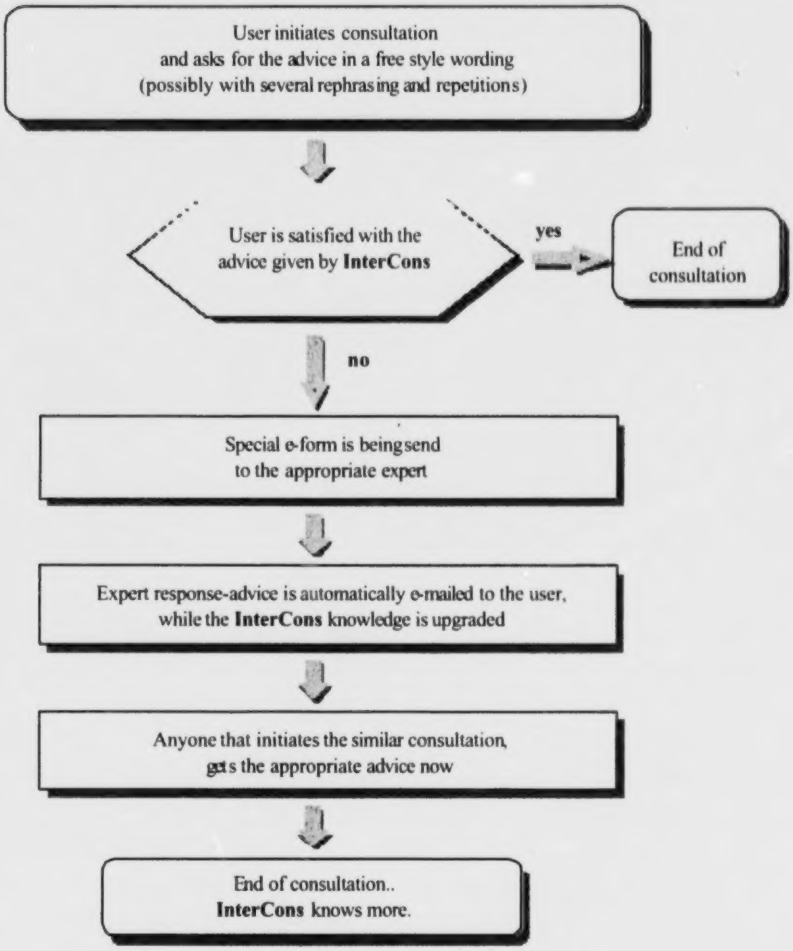
User initiates consultation
and asks for the advice in a free style wording
(possibly with several rephrasing and repetitions)
User is satisfied with the advice given by InterCons
yes
End of consultation
no
Special e-form is being send to the appropriate expert
Expert response-advice is automatically e-mailed to the user, while the InterCons knowledge is upgraded
Anyone that initiates the similar consultation, gets the appropriate advice now
End of consultation..
InterCons knows more.

Figure 2. – Consultation flow, user view

During the application phase, users consult **InterCons** via typing questions in natural language sentences, or some more simplified form, like phrase, keyword, etc. **InterCons** then gives advice. If the user is satisfied with the advice, he can finish, or continue with the new question. If not, the student will send the question via special screen form, then receive the expert advice, while the **InterCons** will learn and extend the knowledge. **InterCons** will gradually become better virtual expert,

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following exactly the knowledge demand from the users-recipients, not only by the expert-professor design.

InterCons(c) MAIN CHARACTERISTICS

InterCons system has several important characteristics that make him suitable for various implementations. Main chracteristics are:

- open fields of application;
- adaptive knowledge growth (based on the "convergent" learning).
- instantly available for anyone connected to the INTERNET;
- immediate, clear use, based on friendly user interface;

Figure 1. presents **InterCons** system structure and information flow.

InterCons(c) INTERNET APPLICATIONS

InterCons main application is INTERNET knowledge transfer. Also, it can be used for simple INTERNET information transfer, professional consultation services, etc. One of the most promising use of the **InterCons** is the integration in the complex system **InterTrans** - *General Purpose Intelligent INTERNET Based Knowledge Transfer,* system made to be the core of INTERNET Virtual Universities [Spasiæ, 1989, 1991b, 1993a, 1998b, 2000a, 2000b].

CONCLUSION

We are now in the phase of INTERNET implementation and testing of the various **InterCons** performance aspects. One of the fields of application is the first Virtual University in Yugoslavia.

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THE INTRODUCTION OF WEB-BASED INSTRUCTION INTO THE UNDERGRADUATE STEM CURRICULA AT FLORIDA A&M UNIVERSITY

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Dr. Dhyana Ziegler#
Dr. Reginald J. Perry+

BACKGROUND

This paper describes the process used at Florida A&M University (FAMU) to launch a series of initiatives specifically designed to integrate web-based instruction into its science, technology, engineering and mathematics (STEM) curricula and improve the overall quality of STEM programs. Florida A&M University, a historically black university (HBCU), is one of the largest producers of baccalaureate degrees to African-American students. Its current enrollment of 12,000 students includes over 1900 students majoring in one of the STEM programs. FAMU is committed to significantly increasing the number of African-American students who qualify for admission to STEM graduate degree programs and ensuring the development of a well-prepared, competitive and diversified workforce in STEM fields.

In the past, undergraduate STEM students have been taught using a standard lecture format, in which, the course instructor controls the pace, the sequence, and the presentation style of the material mastered by the student. However, it is important that STEM students at FAMU become intimately familiar with the same web-based learning environments they will encounter in graduate programs and the workplace so they won't be at a disadvantage and will remain competitive in these fields.

One initiative designed to integrate web-based instruction into the STEM curricula is the National Science Foundation sponsored FAMU – Undergraduate Program (FAMU-UP) Course Development Mini-Grant Program. The FAMU - UP Mini-Grant Program provides funding to FAMU STEM faculty to develop, implement, and assess the effectiveness of web-based teaching and learning methodologies.

The introduction of web-based instruction in the required and elective STEM curricula involves collaboration from all segments of the university community including administration, faculty, staff and students. The integration of instructional technology elements is the key to successful web-based course development. This includes: (1) hardware requirements, (2) selection of web-based course delivery system (i.e., Blackboard) and (3) evaluation of "ease of use" of various web course content development software tools. In addition, several pedagogical issues must also be addressed including: (1) efforts required to "encourage" faculty to incorporate web-based learning and teaching methodologies into their courses, (2) face-to-face instruction versus distance learning and (3) defining which outcome measures should be used to determine the effectiveness of the revised course.

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METHOD

The purpose of the FAMU-UP Mini-Grant Program is to (1) significantly increase the use of web- based technologies for the delivery of course materials to FAMU STEM students and (2) to provide measurable evidence that supports the idea that web based courses can provide an advantage over traditional lecture courses.

STEM faculty members submitted Mini-Grant proposals for up to $10,000 each. Allowable expenses for the proposals included faculty release time, student support, materials and supplies. In addition, limited funds for equipment were also available. A steering committee consisting of the Associate Deans of the College of Arts and Sciences and Engineering, chairpersons of the departments of chemistry, computer and information sciences, electrical and computer engineering, physics and mathematics reviewed each mini-grant proposal and selected the faculty recipients for the FY2000 course development mini-grants. Table I summarizes the projects funded that involved web-based technologies. The projects were developed in several phases.

Department	Project Title
Mathematics	Online Homework Grader for Calculus I
Mathematics	Calculus Web-Based Course
Physics	The Extension and Development of Web Based Tools in the Instruction of General Physics
Physics	Interactive Web Site for General Physics I Course
Physics	Enhancing Physics Education in the Undergraduate Program at Florida A&M University
Mathematics	Web-Based Course Development for Calculus I, II
Mathematics	Interdisciplinary Research Experience for Undergraduates

Table 1. List of FAMU-UP FY 2000 Course Development Mini-Grant Projects involving web-based instruction.

A team-based approach was used to provide the support and technical assistance needed to create the online learning environments proposed by the mini-grant recipients and to integrate the design, content and production of course materials and components. The team consisted of the mini-grant faculty recipient, a student research assistant, a project coordinator, instructional designer, graphic designer and computer support specialist.

Several workshops were conducted to provide training and assistance to faculty mini-grant recipients. A half-day session was conducted to provide information on the fiscal and programmatic documentation procedures involved with the Mini-Grant program. Topics also covered in the session included "Instructional Technology"; "SACS Notification Requirements"; and "Student Learning and Access."

The faculty also received training on the use of Blackboard 5, the web-based course delivery system of choice at FAMU and NetObjects Fusion, a web-authoring tool. The workshops were conducted for mini-grant recipients by staff at the FAMU Instructional Media Center (IMC) and held in the IMC Faculty Development Lab. The faculty also took other workshops offered by the IMC (i.e., PowerPoint, Adobe Workshop) as needed. Additionally, one-on-one sessions were conducted with the mini-grant faculty to address particular needs and to provide further assistance in the development of online course materials and information.

SUMMARY AND CONCLUSIONS

Upon completion of the first FAMU-UP Mini-Grant program cycle, each faculty mini-grant recipient presented or demonstrated the anticipated project outcomes to the FAMU-UP Executive Council and Project Staff. Faculty members are still at varying phases of the project; however at the completion of phase one, all of the mini-grant project faculty had created a course web presence that gave students access to the course syllabus, lecture notes, the course calendar, homework assignments and solutions, links to other sites related to the course and grades. Since the development of web-based courses requires time and effort, additional work is underway to further enhance the development and evaluation of these courses and to make the transition from web-supported courses to a full online implementation of the course.

The FAMU-UP Course Development Mini-Grant Program has the potential to be effective in the future development of web-based learning in the STEM curricular and enhancing distance learning efforts at FAMU and HBCUs in general. After an assessment of phase one of the project, we have learned the following: (1) the importance of continuous communication with program participants, (2) the generation of clear project milestones and (3) the creation of an on-going assessment and evaluation plan. It is also important to maximize the summer session in the development and revision of any courses; as faculty members get more involved in the routine of teaching and research activities during the fall and spring semesters, it becomes more of a challenge to devote the time and resources necessary to create a quality online learning environment.

A future goal of FAMU-UP is to create a ten-week summer learning experience for the faculty and student assistants to acquire the skills and knowledge to meet their particular project goals and have a finished product for the start of the upcoming fall semester. A Best Practices Conference will also be planned, so that mini-grant recipients can share their experiences with other faculty members at the university. The conference will also serve as a dissemination and transfer strategy for further web-based course development projects at FAMU and other HBCU institutions.

ACKNOWLEDGEMENT

We would like to acknowledge the National Science Foundation Division of Human Resource Development, HBCU - Undergraduate Program for providing the grant funding (Grant No. HRD9979944) to support this project.

ARE THEY USING THE TOOL TO LEARN, OR STILL LEARNING TO USE THE TOOL? –AN OBSERVATION OF MIDDLE CHILDHOOD STUDENTS DOING RESEARCH ON THE COMPUTER

Karen S. Robinson, Ph.D.
Patti R. Albaugh, Ph.D.

What happens when students are using computers to do research? This paper describes a study conducted in 18 middle-level classrooms (grades 3-8) while students used computers for research activities. Classrooms were located in suburban, urban, and rural schools. Data were collected during observations of classroom work with computers. The following questions were asked: *How is the working environment arranged? What tasks are students doing? What is the nature of the language being exchanged between teacher and students?*

HOW IS THE WORKING ENVIRONMENT ARRANGED?

Out of the 18 classes observed, 8 were in dedicated computer labs; 3 were in library/media areas; and the remaining 7 were in classrooms. In the labs, the typical arrangement was15-30 computers located along the perimeter of a rectangular room; in two of the labs, computers were arranged along the perimeter as well as along the center of the lab. Most students worked at their own computers, with the occasional pair of students sharing. In the 3 library/media areas, some students worked at computers, while others were working with print sources in the library. In the classrooms, there was a range from 2 to 5 computers (mean = 3.4); in all but one situation, the computers were together, along a wall or protruding from a wall on a table. (One of these teachers also had 10 Alphasmarts in her classroom.). In all but one case in the classrooms, a computer was shared by more than one student (up to 4 students at one computer). In all the classrooms, more than one activity was going on at once, and the teacher was busily managing it all.

WHAT KINDS OF RESEARCH ACTIVITIES ARE STUDENTS DOING?

We stipulated to the teachers that we wished to watch students using the Internet or using CD's and "doing research." We found that teachers define research in many different ways. Students' research activities varied widely and included Internet treasure hunts, online tutorials, structured research projects, and open inquiry. We categorized the 18 activities into 3 task categories. These are listed below, with an example from our observations.

Otterbein College
Westerville, Ohio

Table 1. Task Categories for Students' Research Activities

Task	Description	Example Observed
Scripted Task	Students followed procedure from a worksheet, workbook, or on-screen tutorial; they were assigned a website address or location on a CD. Some kind of "restricted response" was required, such as a fill-in-the-blank or matching item.	Website address was listed at top of worksheet, with names of eminent paleontologists. Seventh graders matched the names with phrases describing the person's contributions.
Combination Teacher Structure/ Student Choice	Teacher prescribed a procedure for finding information. Students made decisions regarding topics to pursue, sources to check, or details to be retrieved. Teacher prescribed method of presenting information learned. Students made decisions about the composition of that information.	Fifth grade students were assigned various sub-topics of "Human Organ Systems." Working in groups, they gathered information from print and computer sources and created a PowerPoint presentation of the information.
Informal Exploration	Teacher gave no procedure for research. Students explored on their own, seeking sources and deciding how to retrieve the information gleaned. Teacher worked as a partner with the children, intermittently responding and facilitating.	An after-school group of fourth graders was organizing for a Destination Imagination project (like Olympics of the Mind). They explored different search engines, looking for background information for an "egg drop" project.

Of the eighteen observations, six involved scripted tasks; eleven were combination teacher structure/student choice, and one was an informal exploration.

WHAT IS THE NATURE OF THE LANGUAGE BEING EXCHANGED BETWEEN TEACHER AND STUDENTS?

While students were working at the computers, we focused on one computer and the user(s) at that computer (target students). We wrote what we saw the target students doing and what we heard them say or what was said to them. One of our major interests was the teacher's language: What would the teachers be saying? Would they be questioning, probing, or giving directions? In most cases, the teacher was moving around the room, addressing the entire group or facilitating individuals as they worked. In general, during a students' time at the computer, there were very few statements directly aimed at the students from the teacher. We analyzed the language statements by sorting into categories, freely adapting those from the work of Oliver and McLoughlin (1996).

The predominant form of language directed at the target students from the teacher (> 90%) was procedural: the teacher made a suggestion or asked a question that involved classroom management or technical assistance. Other categories of language were instructional and cognitive.

Table 2. Categories of Language Used by Teachers to Students

Language	Definition	Examples from observations
Procedural managerial	Stating a simple command or direction: questioning or suggesting a next step pertaining to work behavior	"Who's reading to you? Remember, we discussed that one reads, one writes."
Procedural technical	Stating a simple command or direction: questioning or suggesting a next (technical) step pertaining to the computer equipment or search procedure	"It looks like this site has lost some info, so I'm not sure you're going to be able to answer the question here. Let's go to #3. I'll call out loud the URL."
Instructional	Explaining or questioning about the content being studied	"That's William the Conqueror, not William Wallace."
Cognitive	Urging student to delve deeper into content or search or suggesting alternate inquiry procedure	"What kind of graph do you want? What kind of graph do you need?"

Rarely did students initiate interactions with the teacher during their work at the computers. When help was needed, they often asked nearby friends. When the teacher came close to their area of the room, student-initiated interactions were usually questions about technical procedures (e.g., "How do I print?").

DISCUSSION

Our data have led us to more questions: We ask, "How much research are children learning to do, where they are actually posing questions, strategizing about and locating good resources, and synthesizing their findings? And where does the computer fit into that process?" We did not observe the students and teachers prior to or after the computer use; consequently, we wonder, "Is there more instructional or cognitive discourse (and less procedural) when computers are not being used?" More germane to our work in pre-service are these questions: "Can we arm new teachers with the necessary managerial and technical skills, so that they can give more emphasis to facilitating students' research and inquiry? And can we convince them of its importance?"

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THE DADE PROJECT: A VIEW OF DISTANCE LEARNING FROM A DIFFUSION OF INNOVATIONS PERSPECTIVE

Gary R. Posnansky Ph.D. *
William L. Dulaney*

The Dade Project is defined as a seven-semester distance learning graduate program for practicing elementary and middle school math and science teachers in the Dade County Public School system. The Dade Project began in 1996 with a cohort of 200 experienced teachers, with an additional 50 educators entering the program during the second summer semester (Davis & Tobin, in press; Presmeg, 1998). The Dade Project consists of an innovative combination of internet-mediated interaction coupled with aggressive in-class learning.

This program of teacher development can easily be described as an innovation by offering teachers an opportunity to advance their teaching skills and simultaneously acquire a graduate degree in their area of specialization without leaving home. If we view this program through the Diffusion of Innovations paradigm posited by Everett M. Rogers, we are able to understand many aspects of the innovation and, perhaps more importantly for this project, several factors that the potential adopters may utilize in their decision to adopt or reject this innovation.

Rogers identifies five characteristics by which an innovation may be described, and shows how individuals' perceptions of these characteristics predict the rate of adoption of the innovation. Rate of adoption is the relative speed with which an innovation is adopted by members of a social system (Rogers, 1995). The factors that impact the rate of adoption of an innovation include: 1) the perceived attributes of the innovation, 2) the type of innovation-decision, 3) the communication channels, 4) the nature of the social system, and 5) the extent of change agents' promotion efforts. Of all five of these factors, it is perceived attributes of the innovation that explains from 49 to 87 percent of the variance in the rate of adoption. Clearly this is the most important factor of the innovation relative to the rate of adoption. This factor, perceived attributes of the innovation, is composed of five aspects: Relative advantage, compatibility, complexity, trialability, and observability (Rogers 1995). The purpose of this paper is to describe the perceived attributes of the Dade Project in Diffusion of Innovations terms.

Relative advantage is defined as the degree to which an innovation is perceived as being better than the idea it supersedes (Rogers 1995). It is often expressed as economic profitability, social prestige, or other benefits. The nature of the innovation determines what specific type of relative advantage is important to the adopters, although the characteristics of the potential adopters also affect which subdimensions of relative advantage are most important. The successful completion of the Dade Project provides relative advantage of an economic type to potential adopters by additional pay once the advanced degree is completed.

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A second type of relative advantage, that of social status, is also a motivating force for adoption of an innovation. The Dade Project confers upon the adopter the status derived from a graduate degree as well as the increased information in the area of specialization. Such status increases the adopters' opportunities for career advancement, earning potential, and spheres of influence within the social structure. Relative advantage indicates the benefits and the costs resulting from adoption of the innovation.

Relative advantage is only one aspect of the successful adoption of the innovation. The second most important predictor of adoption is compatibility. Compatibility is the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters (Rogers 1995). An innovation can be compatible or incompatible: 1) with sociocultural values and beliefs, 2) with previously introduced ideas, or 3) with clients needs for the innovation. The Dade Project appears to be compatible with: 1) the sociocultural values and beliefs of teachers in the Miami-Dade District School system, 2) the clients' needs for the innovation of a distance learning math and science graduate program, and 3) previously introduced ideas. The success of the program indicates that there is a willingness to adopt the new means of acquiring the desired consequences.

Another dimension of the compatibility of an innovation is the degree to which it meets a felt need. When the felt needs of the potential adopters are met, a faster rate of diffusion of the innovation usually follows.

The success of the Dade Project reveals that the enrollment in the program quickly increased in the second summer semester by 25 percent (Davis & Tobin, in press). Two major factors of compatibility contributing to the increased adoption rate are the cost of the program and time. The cost of the program is compatible with the budget of elementary and middle school teachers through tuition waivers funded by the Dade County School System with assistance from the National Science Foundation. The factor of time, or more precisely the adopters' teaching schedules, is made compatible via the format of Internet-mediated course assignments, class presentations, and scholarly discussion during the fall and spring coupled with traditional in-class instruction during the summer.

The third factor of innovation adoption identified by Rogers is complexity. Complexity is the degree to which an innovation is perceived as relatively difficult to understand and use (Rogers, 1995). If the innovation is perceived to be very complex, the rate of adoption is slowed. Research indicates that when potential adopters are required to develop many new skills in order to utilize the innovation, the rate of adoption is slowed. The members of the population of potential adopters of the Dade Project find that the level of complexity of the program is low overall, with one exception. Technology is a barrier for some potential adopters in The Dade Project. Specifically, the use of the Internet was a problem for some members of the program. Students are required to submit their work via the Internet, view their peers' scholarly contributions, and to post critical analyses of these works to the class Website. Additionally, students are required to give online presentations and engage in scholarly chat groups as part of the fall and spring curricula. It is the responsibility of each adopter to gain access to a computer and the Internet on a weekly basis; this presented a problem for some students. To their credit, administrators and educators in The Dade Project tackled this issue of complexity by arranging face-to-face meetings with those adopters experiencing difficulty. The success of the program is largely due to The Dade Project instructors readily assuming the role of mentors when needed.

The fourth aspect of the attributes of the innovation that affect the rate of adoption is trialability. Trialability is the degree to which an innovation may be experimented with on a limited basis (Rogers, 1995). According to Rogers, an innovation will be more quickly adopted if adopters are able to experience the innovation on an "installment plan" (Rogers, 1995). The adopters are able to sample the innovation one semester at a time through each of the seven semesters. If the innovation of The Dade Project is found to lack compatibility or to be too complex, the adopter is free to drop out of the program.

Some may argue that the Dade Project is not really available for trial use by potential adopters; either a teacher elects to adopt the innovation or not. We do not oppose this position; rather we posit that the experiences of those members of the population who have already adopted the innovation will serve as a form of trialability for their peers. These early adopters informally or formally report to the greater population of potential adopters, the experiences both positive and negative they encountered in adopting the innovation. These experiences can be viewed as a vicarious trial for potential adopters. A major goal of The Dade Project is to train experts in the fields of elementary and middle school Math and Science education for the purpose of diffusing knowledge to others in the social structure that is the Dade County School System (Davis & Tobin, in press).

The last of the attributes of the innovation discussed by Rogers is observability. Observability is the degree to which the results of an innovation are visible to others (Rogers, 1995). The results of some ideas are easily observed and communicated to others. The Dade Project is a type of innovation that is easy to observe. Members of the group of adopters will successfully complete an advanced degree and acquire additional information in their area of specialization. Members of the Dade County School System attended the first graduation in order to witness the accomplishments of the first cohort of adopters. Their experiences are observable on these different levels.

The overall success of the Dade Project is evidence that the attributes of the innovation are viewed by the population of potential adopters as positive with respect to adoption. The program seems to have adequately addressed the aspects identified by Rogers that influence the rate of adoption of the innovation.

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THE INTEGRATION OF A RESOURCE WEB SITE IN THE TEACHING OF ON-LINE AND TRADITIONAL COURSES.

Dr. Donald M. Morales

Abstract

http://www.mercynet.edu/faculty/morales/AfricanLiteratureResource

The African Literature Resource Web site serves both distance learning and traditional, campus-based classes. The site has links to an interactive map page of Africa; an "Informational" page containing important links in the field of African, Caribbean and Diasporan literature; a "Writers" page with text links and video clips of selected writers in these fields [e.g. Dennis Brutus, South African poet; Nawal El Saadawi, Egyptian novelist; Narrudin Farah, Somalian novelist]; an "Academic Institutions" page with links to national and international archival and library centers. In addition, there is a "Student" page with selected course-work articles by students from a current African Literature course. A Directory link lists the e-mail addresses of African Literature Association members.

The purpose of this site is to service the research and resource needs of on and off-line classes, which in my case include African Literature, Caribbean Literature, the Black Atlantic World and Recent Nobel Laureates. Naturally, the site can also be of use for the general student/reader who has an interest in these fields.

The "Academic Institutions" link is active and lists academic institutions associated with the African Literature Association. Users of the Web site can go directly to these resources, which are generally national and international archival or library sites.

The "UWAP Bulletin" posts upcoming events/conferences etc.

As of now, the "Writers" page has two QuickTime videos of authors; the other author links are text-driven. What I propose to add to this page are live 60-second interviews of authors. This is the major portion of the proposal and probably the most dynamic. Students tend to develop closer ties with authors they hear and see. On the current page, Dennis Brutus reads poetry to a student body: Nawal El Saadawi talks about the social commitment of her writing; Narrudin Farah discusses his daily work regimen as a writer.

The "Information" page list a number of quality resource sites that will aid in scholarship and research. One example is H-Africa, a listserv for African Studies academics. Their Web site has a search engine that will give the logs of a discussion around the subject of a search. Henry Louis Gates' Wonders of the African World series on PBS generated a great deal of interest, generating over 700 messages for that topic.

Mercy College

Students are actively involved in the project. Over the years, our institution has supported student attendance at conferences with faculty and these students report their impressions on the "UWAP Bulletin" page. Moreover, on the "Students" page, responses to assignments from the current African Literature class appear. Following is a typical essay question:

Ketu H. Katrak in her *Wole Soyinka and Modern Tragedy: a Study of Dramatic Theory and Practice* [Greenwood, 1986] argues that Soyinka's sympathies rest with Elesin:

> Soyinka's poetic language and the subtlety with which he has cast the dice for and against this ritual of suicide have misled critics...into believing that the playwright is celebrating the custom. Soyinka is [criticizing] this tradition, though indirectly as is consonant with his artistic method. This is implied in Soyinka's sympathy to Elesin's basic human instinct for survival rather than for death....Although Elesin is condemned by the community, the dramatist captures his human plight, his fear before the frightening abyss. Soyinka is surely questioning this kind of heavy communal demand which requires a man to sacrifice his life for the sake of some unspecified benefit to the community. [89-90]

Agree or disagree with professor Katrak's position using specific examples from the play and the Gotrick essay.

Students are forewarned that their audiences will be worldwide. It will be interesting to see if these papers differ in quality from papers with a more limited audience.

THE NAPSTER REVOLUTION ON COLLEGE CAMPUSES: HOW UNIVERSITIES AND THE RECORDING INDUSTRY ARE COPING WITH THE MUSIC FILE-SHARING SENSATION

Thomas Hutchison, Ph.D.

The rise of the Internet has produced new social practices that never could have been predicted. Among those is the practice of peer-to-peer (P2P) music file sharing. This swapping was encouraged by the introduction of a file compression technology known as MP3. This software program, which Internet consumers gained access to in the mid-1990s, enables users to compress recorded songs from personal music collections into a file of 3.5 megabytes from a song on CD originally of 40 MB, thus decreasing transfer time from two hours to 10 minutes.

This convenience began to fuel the practice of file swapping and was further encouraged by the introduction of the website MP3.com, portable MP3 players, and later, Napster. Instead of following in the footsteps of MP3.com, which provides music from its own database, Napster introduced a web site in 1999 that allowed MP3 users who were looking for and offering music files to connect with each other, thus facilitating P2P file sharing. MP3.com was sued by the 5 major record labels, but four of those labels eventually settled, costing MP3.com millions of dollars. Napster hoped to avoid such litigation because the service does not actually disseminate the recorded music files; it merely connects users who then exchange the files directly with each other.

Napster became an overnight sensation in 1999. *Business Week* states "Napster raged across the college circuit like a forest fire. College students throughout the US were discovering Napster, and they couldn't get enough of it" (Business Week, 8/14/00). Colleges became the hot spots of Napster activity because students had access to the high-speed connections that still are not prevalent in homes.

THE POPULARITY OF NAPSTER

In June 1999, Napster founder Shawn Fanning distributed beta software of the new system to 30 friends. In just a few days, 3-4,000 people had downloaded the software. By the beginning of fall semester 1999, college campuses were caught off guard as returning students began to take advantage of the campus facilities to download music files. *Webnoize* reports that as of March 2001, a whopping 85% of students have downloaded music--nearly 58 % of them using Napster. The actual number of users has been estimated at between 20 million and 66 million. Media Matrix, Inc., which measures Internet growth, has called it the "fastest-growing Internet utility in history," as it has landed on 6% of all home PCs. Napster's popularity is widely attributed to the fact that the service is free. But students use Napster for other reasons, and half of students surveyed indicated they would be willing to pay for the music they download. Napster offers its young customers convenience and depth of product.

THE RECORDING INDUSTRY RESPONDS

The impact of file swapping on music sales is subject to debate. Sales were up

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nationally over the past two years overall, but sales were down by 4% in stores located near college campuses. The recording industry used this figure as a basis for a lawsuit. A survey by Field Research found that the more people use Napster, the fewer discs they purchase, and 41% of users indicated that the main reason they use Napster is to avoid having to purchase music they like. But almost 60% said it had no effect on their purchases and that it helps them decide what records to buy. A study of online shoppers by Greenfield Online found that "nearly 70% say that they have not paid—and will not pay—for digital music downloads." The same study found that two-thirds of college students who use Napster say they download so they can preview music before deciding which CDs to purchase. Jupiter Research has found that 45% of users are more likely to have increased music purchases as a result of sampling via downloads, and 71% are willing to pay to download entire albums.

Nevertheless, the Recording Industry Association of America (RIAA) sued Napster in December 1999, claiming Napster had cost the record labels more than $700 million in lost sales. The RIAA sued for copyright infringement alleging that "the popular music trading service helped facilitate massive piracy among its…users." In April 2000, the RIAA was joined by the rock band Metallica who sued Napster and three universities that the band said had encouraged students to pirate their music. In October of 2000, media conglomerate Bertelsmann AG announced a partnership with Napster to develop a subscription-based music service. As a result, Bertelsmann Music Group (BMG) withdrew from the RIAA lawsuit.

COLLEGES RESPOND

Universities were forced to react to the phenomenon by the fall semester of 2000 when students returned to campus. By then, Napster was facing the lawsuit from the RIAA as well as the suit filed by Metallica and rapper Dr. Dre. Metallica's drummer had delivered to Napster the names of 335,000 users who had illegally copied the band's recordings. Add to that the Metallica/Dr. Dre suit against three schools, Indiana University, the University of Southern California (USC), and Yale, which had been filed that April. Howard King, attorney for the recording artists, stated, "Metallica selected the three large, diverse universities to make examples of them." Officials at Yale were quick to react, announcing that they would ban use of Napster on campus. A Yale spokesperson commented that the block was in effect "until legal issues could be clarified, even though the university did not believe it has any liability to Metallica." The band agreed to drop Yale from the suit.

Indiana University also responded quickly and agreed to block access. Indiana had previously lifted its ban on access to Napster to test new software designed to alleviate network congestion. The university promptly reinstated the Napster ban.

Both universities emphasized an interest in protecting intellectual property; however, they did not admit responsibility. Yale released a statement saying that "the law [Digital Millennium Copyright Act] relieves 'on-line providers'—such as universities that offer Internet connections to students—of some responsibility for copyright infringement by their users." USC, which was involved in "town meetings" with students over bandwidth issues at the time of the Metallica lawsuit, initially decided against banning access to the site. However, the October 6 issue of *The Chronicle of Higher Education* reported that the lawsuit had been dropped against all three schools "after they agreed to block access to the Napster service."

In September 2000, King sent letters to 27 colleges asking them to block access to Napster. After two weeks, none had agreed. University of California officials rejected the request, comparing Napster's removal to removing copying machines because they could be used to reproduce works illegally. By October 6, at least 14 of the schools had decided not to ban access: Columbia, Cornell, Duke, Harvard, Princeton, Stanford, Georgia Institute of Technology, Massachusetts Institute of Technology, U.C. Berkley, UCLA, University of Florida, U. of Michigan, U. of Pennsylvania, and UNC. King stated he would not file suit but would attempt to "educate them about copyright infringement."

Throughout the fall semester, schools formulated policies for dealing with the issue, until more than one-third of US colleges had banned access. Other schools, such as Cornell and the University of Virginia, opted to educate students about copyright issues. Oklahoma State campus police confiscated one student's computer after determining it was being used in copyright violations.

But legal concerns weren't the only reasons for the shutdown. Schools reported that Napster traffic was clogging campus servers. Two of the nation's largest schools, the University of Texas and Ohio State, decided to block Napster solely based on the fact that the music swapping was clogging campus servers. Texas estimated 20% of their bandwidth was going toward Napster use. Smaller campuses estimated that between one-third and one-half of campus traffic involved Napster. In a notice to students, Bates College pleaded with students to use Napster only during off-peak hours, claiming it hogs up to 90% of the network. Students at BYU found it difficult to register for classes or apply for financial aid this past January, due to Napster. At that point, BYU decided to block the site. USC was in the process of educating its students about the bandwidth bottleneck when legal concerns prompted the school to block access to Napster.

CURRENT STATE OF AFFAIRS

A March 2001 ruling by a U.S. District Court of Appeals upheld an injunction against Napster, requiring it to block copyrighted songs. Four of the five major record labels have refused to grant licenses to Napster despite the offers of millions of dollars to do so. The ruling angered students but came as a relief to embattled administrators who had been trying to balance copyright protection, and server limitations with open access to the Internet. After a last minute grab for songs, the injunction went into effect and traffic on the Napster site has been somewhat reduced. Meanwhile, campuses are looking into bandwidth management programs such as Packetshaper®, which is designed to prioritize server traffic, preventing a single type of traffic (such as streaming media) from monopolizing the network. Implementation of programs such as this on college servers will come just in time to manage the next craze--streaming video--which students will have access to in the near future.

SCIFAIR.ORG, A WEB BASED RESOURCE FOR ELEMENTARY TO GRADUATE SCHOOL

John W. Gudenas, Ph.D.*

INTRODUCTION

SCIFAIR.ORG (Gudenas, 2001) is titled on the web site and to search engines by meta tags as the "Ultimate Science Fair Resource". This project is used as a productivity center for elementary students through high school. Email indicates that teachers as well as students and their parents actively use the content material. SCIFAIR includes an Idea Board that provides students with a platform to exchange project ideas. Users find a prolific number of project concepts here. However, editing is required from the registry to prevent duplication and sophomoric comments, typically from middle school students, before actual posting to SCIFAIR occurs. A Research section exists that allows a student access to a taxonomic structure of scientific disciplines and productive URL's to gather information. While these are the most popular sections Table 1. lists the active content of the site.

Articles:	**Resources:**
Project Steps	The Idea Bank
Project Hints	The Idea Board
Scientific Method	Science Research
Writing Reports	Books
Display Boards	

Contact Dr. John and colleagues

Table 1.
Content of SCIFAIR.ORG

In order for the project to be productive it must have exposure to web users. The domain name was purchased in July 2000 specifically because it had developed a reputation over three years and had been already available as a resource and accessible to major search engines. The site underwent enhancements using standard (Tapper, 2000) marketing techniques and design, especially associated with general link clean up and human computer interaction. These techniques proved successful as the school year started, SCIFAIR gained users rapidly and the ranking was improving dramatically. By November of 2000 SCIFAIR was usually listed in the top ten (first page search presentation) of Google, Yahoo, AOL and other engines. A search under "science fair" or "science fair resource" would produce these results.

A decision was made to maintain complete control of intellectual property and use a separate web hosting service from the university computing system (Samuelson, 2001).

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This process allowed SCIFAIR to be run as a business under sole proprietor control designed to make a profit and insure perpetuity. Running SCIFAIR as a viable business also produced another benefit. The techniques associated with running a successful e-commerce were instantly ported into the Computer Science classroom as web page design and human computer interaction and into the Management Information Systems classroom as actual and revenue producing e-commerce. SCIFAIR is an entity with dual functions. It is a resource used by elementary and high school students including their teachers and parents and it serves as an active web based laboratory that brings immediate technology and techniques into the university classroom. Maintaining intellectual property and distance from university academic computing is essential for a real business and control without interference. It also allows discretion in releasing content to teachers that request distribution rights for their class (Burke, 2001).

RESULTS

SCIFAIR proved to be amazingly successful. Applying solid web design and insuring ease of navigation plus appropriate content, tripled the use of the site. In January 2001, SCIFAIR took over one million hits. Table 2. Indicates the monthly activity that has occurred to the date of this report.

HITS	BYTES	VISITS	PVIEWS		
91,041	[illegible]1,546,040	3,772	12.[illegible]	Nov 1999	■
129,512	[illegible],522,541	7,332	17.[illegible]	Dec 1999	■
364,[illegible]	1,[illegible],479,866	27,435	85.[illegible]	Jan 2000	▬▬▬▬
334,955	1,[illegible],133,607	34,314	104.[illegible]	Feb 2000	▬▬▬▬▬
251,829	1,115,344,770	23,356	73.341	Mar 2000	▬▬▬▬
182,644	951,561,366	21,[illegible]	52.775	Apr 2000	▬▬▬
140,825	[illegible]1,462,675	12,556	35.155	May 2000	▬▬
45,152	[illegible],398,000	3,229	11.155	Jun 2000	■
42,630	213,246,264	4,354	11.223	Jul 2000	■
137,161	[illegible],994,355	16,361	37.[illegible]	Aug 2000	▬
476,770	2,[illegible],900,266	43,[illegible]	13[illegible].235	Sep 2000	▬▬▬▬▬▬
670,387	4,[illegible],547,236	57,[illegible]19	20[illegible].[illegible]75	Oct 2000	▬▬▬▬▬▬▬▬
698,309	4,[illegible]1,304,350	55,534	222.225	Nov 2000	▬▬▬▬▬▬▬▬
373,956	2,5[illegible],760,394	31,533	[illegible]	Dec 2000	▬▬▬▬▬
1,024,616	7,[illegible]41,906,062	53,[illegible]	32[illegible]	Jan 2001	▬▬▬▬▬▬▬▬▬▬
750,691	5,[illegible],407,863	33,444	223.41[illegible]	Feb 2001	▬▬▬▬▬▬▬
560,007	3,[illegible],090,642	43,[illegible]	16[illegible]	Mar 2001	▬▬▬▬▬▬

Table 2.
User Activity on SCIFAIR

The usage of the site follows the typical academic calendar with the exception of December. One explanation of low activity in this month has associated the holiday season and school vacations. Another possibility may be related to doing

BEST COPY AVAILABLE

research at school computing facilities, however, the following time usage indicated in Table 3. Does not fully justify this hypothesis.

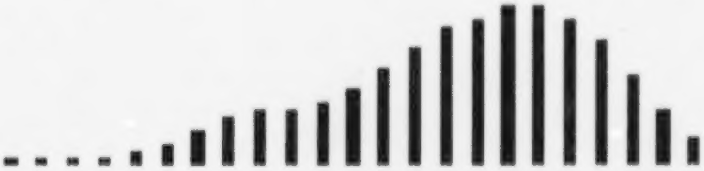

Table 3.
Activity Hours 1 - 23 Using Pacific Standard Time

E-COMMERECE ACTIVITY

A limited number of sponsors were chosen for the entry portal of SCIFAIR that would be non competing and offer useful service to SCIFAIR users. For a flat yearly fee these sponsors were allowed to place a banner ad on the entry portal. All sponsors enjoyed success and banner rotation was not necessary due to the complimentary nature of the sponsors business (Williams, 2000).

An affiliate program with Amazon also established a revenue source. Students as well as teachers need sources for books on science fair projects. These revenue producing agents using basic pull marketing techniques presented a service for users that were short of time or did not know where to find supplies or ideas for project construction. SCIFAIR data also provided experimental web techniques that were instantly brought into an MBA and undergraduate MIS course.

HCI EXAMPLE

A simple line existed in the menu items that allowed students to "Contact Us" by a click through if they had questions. This technique resulted in approximately 3 email contacts/day. A side column graphic was added that presented a characterized scientist and the column frame area titled "Ask Dr. John". A click on the scientist brought the user to a picture of this author sitting at the home computing station and personalized the activity. Email activity increased to 30- 40 help-requests/day within one week and continue at this level. Thousands of email responses have been sent with approximately 20% to teachers and parents.

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GRAMMAR? WHO'S INTERESTED? USING ONLINE RESOURCES TO TEACH GRAMMAR

Marilyn Ford*

To help students with writing skills, the School of Computing and Information Technology at Griffith University introduced a self-paced web-based subject using existing Internet resources. Students quickly complained that they "got lost" in the site. It was decided that a site should be designed that was simple to navigate and that engaged students. It was felt that an engaging Flash site could be developed with a simple layout requiring no scrolling and with animated features under the user's control. However, the development of such a site would be costly and time consuming. Perhaps a simple text HTML site would do just as well. While literature comparing web, lecture, and correspondence courses exists (Collins 2000; Liu, Walter & Brooks, 1998; Smith & Taylor, 1995) there appears to be no literature comparing simple text sites versus more dynamic sites. It was therefore decided to conduct an experiment comparing students' performance on, and preferences for, an animated Flash site versus a simple text HTML site.

METHOD

SUBJECTS

There were two groups of subjects. One consisted of 36 subjects who were studying Natural Language Processing (NLP) and the other consisted of 39 students studying User Interface Design (UID).

MATERIALS

A pre-test and post-test on pronouns were designed. Both contained 18 sentences with a pronoun that required completion. The structures of the tests were the same, differing only in wording and example order. An example of a test item is:

The company did not increase it__ profits.

Two web sites about pronouns were developed containing the same information. One was a text HTML site containing three pages, two of which required scrolling. Color was used to provide contrast between headings, informational text, and examples. The other site was written in Flash and contained animated buttons, rollover "hot spots" that gave more information, and animated examples with pronouns of the one type falling into their appropriate position. Color was used to highlight examples, differentiate different types of buttons, and to indicate text that could be rolled over to reveal more information.

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PROCEDURE

Each subject first completed the pre-test. After the pre-test, half of both groups was directed to the text HTML site and half to the Flash site. Each subject was asked to learn about pronouns using the site and then inform the instructor as soon as they had finished. Subjects spent about 10 – 20 minutes using the required site to study the lesson. As soon as each subject was ready, they were given a post-test. On completion of the post-test, each subject was directed to the other site and given a questionnaire asking which site they would prefer to use and why. The UID students were directed to the sites immediately after completing the pre-test. Most of the NLP students were directed to the sites a week after completing the pre-test. This different arrangement was simply due to differences in timetabling for the two groups.

RESULTS

One subject achieved full marks on the pre-test. He also achieved full marks on the post-test. Of the remaining 74 subjects, 63 improved on the post-test, 4 got worse, and 8 stayed the same. Subjects with different pre-test scores obviously have differing chances to show improvement. To allow for this, the average degree of improvement for subjects achieving each pre-test score was calculated and then each subject was classified as improving more or less than the average for people with their particular pre-test score. Four subjects achieved outlying scores that did not allow the calculation of an "average" improvement score for a person with their pre-test score. These four subjects were therefore eliminated.

Of the remaining 34 Flash subjects, 62% showed better than average improvement, while of the remaining 36 text HTML subjects 47% showed better than average improvement. The results showed, too, that the NLP students tended to improve more than the UID students. For the NLP students, 70% of the Flash subjects and 55% of the HTML subjects showed greater than average improvement. For the UID students, 55% of the Flash subjects and only 39% of the HTML subjects showed greater than average improvement. It appears that the Flash site tended to lead to greater than average improvement for both the NLP and UID students, but the NLP students tended to improve more than the UID students.

An analysis of which site the subjects preferred revealed that 60% preferred the Flash site. Of the UID students, 64% preferred the Flash site. For NLP students, the preference for the Flash site was 56%. Further analysis revealed that there was a tendency for preferences to be affected by which site was used first. For the NLP students, 65% of those who used the Flash site first preferred it, whereas only 47% of those who used the HTML site first preferred the Flash version. For the UID students, 70% of those who used the Flash site first preferred it, whereas only 58% of those who used the HTML site first preferred the Flash version.

The reasons subjects gave for their preferences were also analyzed. The subjects who preferred the Flash site tended to give multiple reasons for their choices. The top eight reasons given by the 45 subjects who preferred the Flash site, together with the number of subjects giving each reason, are presented here:

More interesting, fun, keeps attention ***21***
Visually appealing ***14***
Navigation was easier ***9***
Animated pronouns show similarities ***6***
Information in bite size pieces ***20***
More interactive, dynamic ***10***
It's not linear ***7***
The rollovers were good ***4***

The top eight reasons given by the 30 subjects who preferred the HTML site, together with the number of subjects giving each reason, are presented here:

Comparison of pronouns is easy ***9***
Navigation is clear and easy ***5***
It's clearer ***4***
Flash pronoun animation too fast ***3***
Less button clicking required ***8***
More information is presented on a page ***5***
It's faster to get through ***4***
It's easier to remember things ***2***

DISCUSSION

Given the results of the study it has been decided to continue with the development of the Flash site. The subjects' improvement tended to be better using that site. This was true even for the UID students who, given their background, were more interested in looking at the interface rather than learning about pronouns. Also, the subjects tended to prefer the Flash site and those who preferred it were more enthusiastic about their choice than were those who preferred the HTML site. The concerns of the subjects who preferred the HTML site must, however, be taken into account. In the development of the Flash site, more care will be taken to limit the number of required button clicks, rollovers will contain comparative information, and the animation of words or sentences will be slowed down. The concerns of those preferring the HTML site will also be considered in the future development of dynamic presentations for the Flash site.

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IDENTIFYING STANDARDS FOR ONLINE EDUCATION SERVICE PROVIDERS

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The advent of the Internet and the use of the World Wide Web (www) have changed the ways people and organizations disseminate information, broadened the means by which industries worldwide deliver services and, in so doing, shortened the distance between members of the global community. These developments have also provided implications and opportunities for the establishment and maintenance of mutually beneficial online alliances worldwide.

EdNA Online – an online manifestation of the networked education community in Australia (hence the acronym EdNA for Education Network Australia) – plans to be in a position to capitalise on these national and international strategic alliances. The administrators of and contributors to EdNA Online realize that to achieve this goal, however, EdNA Online will need to continue to be perceived as an 'attractive' potential alliance member.

To this end, EdNA Online needs to identify its current position, audit the online education environment so that it has an understanding of the capabilities of its competitors, then take strategic action so that it is viewed as being among *the best of the best* in the area of online education services provision.

This study was designed to achieve four major objectives:

- identify the characteristics/functionalities which EdNA Online currently demonstrates
- compare EdNA Online characteristics/functionalities with those demonstrated by other online education services providers
- recommend strategic action so that EdNA Online's characteristics/functionalities not only match, but exceed, those demonstrated by other education services providers
- deliver a tool which will help EdNA Online evaluate collaborative opportunities

A review of the literature showed that comparative studies of websites had already been undertaken and reported. The various approaches and findings were studied and as a result a research plan, based on preceding studies but fare more comprehensive in its focus, was developed.

Benchmarking, which inter alia provides the opportunity for an organization to identify its current position, compare itself with its competitors or others, identify gaps between current and potential performance and provide a blueprint for performance improvement, was identified as the most suitable methodological approach. A total of 40 sites (referred to as the benchmarking partners) were included in the study: 11 Australian sites including EdNA Online and 29 international sites.

The tables below summarize the results of the benchmarking study. They should be read with the following classificatory scale in mind.

1. EdNA Online does not demonstrate comparable function/characteristic
2. EdNA Online is ranked less functional than average
3. EdNA Online is comparably function/ranked average/not ranked, or the listed functionality/characteristic is present
4. EdNA Online is deemed better than average functionally/demonstrates more evidence of characteristics than average
5. EdNA Online is deemed highly functional/one of only a few demonstrating the particular functionality/characteristic

How EdNA Online compares with benchmarking partners

	EdNA Online comparison				
Functionality/characteristic	1	2	3	4	5
TECHNICAL					
Speed of loading home page				•	
Speed of loading sub-pages				•	
Obvious menu or set of navigation choices to aid navigation			•		
Navigational choices				•	
Frames				•	
Frames with toggle option					•
Ease of use			•		
Intuitiveness			•		
Splash page		•			
Image independence			•		
Image map	•				
Accessibility for those with impairment(s)					•
Theme			•		
Consistent use of colour			•		
Consistent use of fonts		•			
Links to homepage			•		
Links to help				•	
Opportunities to elicit feedback				•	
Hyperlinks				•	
Use of metadata			•		
CONTENT					
Currency – regularity of site updates			•		
Scope of content			•		
Information in languages other than English	•				
Variety of content			•		
RESOURCES					
General quality of resources			•		

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Information pertaining to the source of resources				*	
Methods of evaluation and quality assurance					*
Detached metadata			*		
Use of metadata based on international standards			*		
Use of Dublin Core standard			*		
SERVICES (INTERACTIVE)					
Presence of discussion lists			*		
Number of discussion lists					*
Archiving of discussion group content			*		
Options for content retrieval on a daily, weekly, monthly and yearly basis				*	
Presence of messaging services			*		
Use of noticeboards to impart messages				*	
Archived messaging service			*		
Sort function in the retrieval of archived postings to noticeboards				*	
Contact/feedback mechanisms			*		
Forms provided for user feedback			*		
Feedback mechanisms clearly visible			*		
Hosts online forums			*		
Online forum sites available for user groups			*		
Formal 'event' structure it has adopted for online forums			*		
Breadth of audiences served with online forums			*		
No charge for participation in forums			*		
Online forum information archived				*	
Real-time chat sessions			*		
Chat can be used in every online forum event			*		
Archiving of real-time chat sessions			*		
Web conferencing		*			
Interactive services					*
Overall help functionality		*			
Provision of help system features			*		
Comprehensiveness of help feature			*		
Clarity of help messages		*			
Ease of use of language in help system		*			
Site map	*				
Glossary function			*		
Thesaurus feature	*				
Range of media options		*			
Tools overall		*			
OTHER SERVICES					
Push services			*		
Push service information archived			*		
Sibling sites			*		
Online services generally			*		
E-Commerce opportunities		*			
Customisation of webpages service	*				
	*				
	*				
Host website for non-profit organisations	*				
Online art gallery	*				

DESIGN AND DEVELOP WEB-BASED TRAINING: AN INTERNET COURSE

M. Beatriz Beltrán, Ph.D.*

ABSTRACT

The process followed to develop a Web-Based Training course has a tremendous impact on the trainees and work performance. This paper describes a Web-Based Course on how to design and develop Web-Based Training courses.

Web Based Training is adopted by international organizations to provide more economic training. Instructor-based courses requiring expensive traveling are replaced by courses on the organization's Intranet.

However, many organizations have discovered that after a few tries, employees are not completing the alleged Web based courses. One of the main causes of these unexpected results is the approach used to prepare and submit the course content into the Web. Most "Intranet courses" are none other than the same materials previously used in the classroom, converted from a word-processor to HTML.

This presentation provides pointers on how to adapt existing materials to become effective Web-Based Training courses. The method emphasizes the importance of Instructional Design.

MORE THAN ACADEMIC PUBLISHING

The hypermedia format used by the WWW receives wide approval in academic and industry training environments. Its potential as a learning tool derives from the nature of the learning that it supports. Hypermedia supports and encourages browsing and exploration, learner behaviors that are frequently associated with higher-order learning

The World Wide Web compares with how the brain works. The core analogy is between hypertext and associative memory. Links between hyper-documents or nodes are similar to associations between concepts as they are stored in the brain. The analogy goes much further, including the processes of thought and learning.

Electronic text and especially hypertext, is not just print text displayed on the computer screen. Web authors and writers argue "it is a new form of communication that poses substantial challenges for those who would create texts that are well suited to this new medium." [1]

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One main difference with printed text is that all documents on the web must carry their contexts and explanatory information carefully embedded within them to ensure that readers find them useful.

WEB PUBLISHING AND WEB BASED TRAINING

Many academic institutions, as well as international organizations, proclaim they are currently using the advantages of Web publishing without considering the differences between paper and Web publishing. Web publishing is not just print text displayed on the computer screen.

Many institutions are using the Web to train students and/or personnel to provide more economic training. Instructor-based courses requiring expensive traveling are replaced by courses on the organization's Intranet.

Sadly, in most cases, these so called Web Based Training (WBT) courses are none other than the same materials previously used in the classroom, converted from a word-processor to HTML.[2]

Web publishing and Web Based training requires a complete new approach to writing academic papers and course materials.

DESIGN AND DEVELOPMENT OF A WBT COURSE

To prove the point, a WBT Course based on Instructional Design Models and Learning Styles theories was developed and implemented. The course encourages potential Web instructors to professionally assess the needs, design, develop and implement Web-Based Training.

http://www.ubs-translations.org/itedu/web_training/internet_training.htm

The course is instructor-based to support the learners at their own pace through email and IRC (Chat). To complete the entire course takes from 48 to 72 hours.

The course gives especial emphasis to instructional design for the web and includes suggestions on what are considered to be good and bad practices for web-based instruction. People taking the course obtain notions of pedagogy and andragogy (adult education), learning styles theories and cultural diversity awareness.

The course takes the trainees through the phases of Instructional design as described on the Hannafin Peck Design Model. (See Figure 1) In the first phase, a needs assessment is performed. This phase is followed by a design phase. In the third phase, instruction is developed and implemented. In this model, all of the phases involve a process of evaluation and revision.

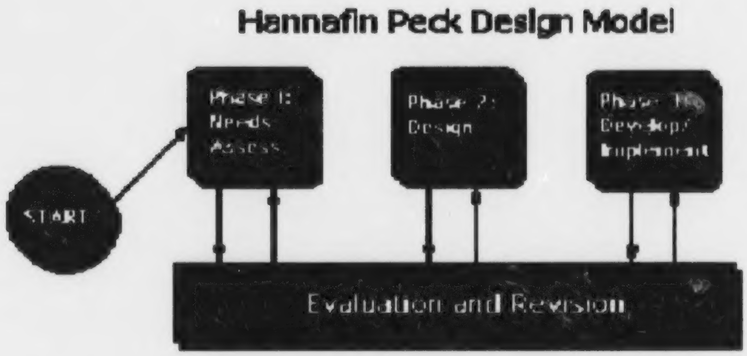

Figure 1

During the design phase, existing training materials are analyzed to check if they cover the determined needs. If they do, then they need to be reorganized and sometimes rewritten during the development phase.

ADAPTING EXISTING WRITTEN MATERIALS FOR THE WEB

To adapt existing materials for the web each piece of information needs to be "break apart" and rewritten by people trained in technical writing. The break apart, or "chunking" procedure, is necessary to extract from each piece just the absolutely necessary and meaningful information.[3]

Concepts:	***Facts***:	***Procedures***:	***Process***:	***Principles***:
Group of objects, symbols, ideas or events that are designated by a single word, share common features and vary on irrelevant features.	A unique specific, one-of-a-kind information	A sequential series of steps to be followed by a single individual to accomplish a task or make a decision.	Flow of events that describe how something works.	Statements of a cause and effect relationship that provide learners with general guidelines for action.

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EXPERT TO WEB PAGE, TECHNOLOGY TO THE RESCUE

Charles R. Bauer*
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ABSTRACT

Phase One of the Webwings (www.webwings.org) site was developed cooperatively by the Academy of Model Aeronautics and the Outreach programs of the Indiana Academy, Ball State University. The purpose of this web site is to use aviation concepts to provide middle-school teachers with web-based materials to assist in the teaching of mathematics and science. Phase Two will provide web-based Single Concept Learning Modules that demonstrate how to build and fly various types of model aircraft. Experts are video-taped building and flying models; then, using present technology, these tapes are changed into web pages.

BACKGROUND

The Academy of Model Aeronautics (AMA) is the organization for those who fly all types of model aircraft. At present in the United States there are about 160,000 members and 2600 organized clubs. As a non-profit organization, one of the important tenets of the organization's mission statement is education. The Education Committee of the AMA is deeply involved in educational pursuits. Many AMA clubs are presently working with local youth groups and schools to introduce aviation through modeling. Presentations are made by committee members at national science teacher conferences, with hands-on workshops provided. The AMA web site www.modelaircraft.org provides links to many successful school-based programs.

Ball State University, through the outreach programs of the Indiana Academy, is

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one of the leading institutions in providing video and web-based educational programs for schools. Their expertise in developing web-based materials has led to the success of phase one of the Webwings web site.

TODAY

Webwings has proven to be a valuable teaching tool for students and teachers in the classroom. Using each of the ten concepts in the first site, a teacher can build entire lessons using the curriculum material. The individual modules provide definitions of the basic scientific concepts, some pre-lab, in-lab, and post-lab experiments to demonstrate how these concepts actually work, and an evaluation section to test a student's retained knowledge after the lesson.

Recent experience using Webwings with a partner school in Schenectady, New York has proven the value of this series of web sites.

The Office of Outreach Programs used the Webwings site as a jumping off point for a live "electronic field trip" called *How Things Fly*. The program was developed with the National Air and Space Museum and shown to more than 9 million students nationwide.

In preparing curriculum for the *How Things Fly* field trip, a group of teachers in Schenectady, New York were engaged to make lesson plans for the program. Several were familiar with basic science but not the complex physics concepts required to understand flight. The teachers used the Webwings site as a tool to begin the process of researching and understanding these concepts. From this study, they were able to develop independent material that was used both for the electronic field trip in on-air demonstrations, and also for a companion web site called How Things Fly. That site links to the Webwings site to offer visitors the additional material provided there.

The content for Webwings was created by Don Hey, and Allison Bell over the course of several months. Each module was discussed at length and appropriate curricula developed around the central topic. From these notes, the web pages themselves, all 187 of them, were written, with graphics and animations added to exemplify the content. Once the content of each module was complete, the post-lab activities (quiz and discussion questions) were added, based on the actual content of the module. The completed module was added to the site and made available to the public.

The goal of the Webwings program, making the physics of flight and model aviation interesting and understandable to middle school students, was achieved through this process. Millions of students have been able to learn about the concepts and will have additional resources on how to implement them using model aviation with the development of the second phase of Webwings.

Communications from teachers using the Webwings site have had one common thread: "What do we do next?" Many have expressed the need for assistance in actually building and flying small model aircraft. Some schools have been fortunate to have local modelers who are willing to come into the school and help with such a project. Phase two of Webwings is an attempt to make available to anyone experts who can demonstrate the "how to" of model building and flying.

The problem is that the experts are not always available, nor do they have the skills to produce a web page or develop a scripted presentation. Technology to the rescue! Experts can be asked to do their thing and allow themselves to be video taped. Using the computer technology now available this tape can be used to prepare a Single Concept Learning Module for all to use.

The steps to produce the finished web page are as follows. The video from the expert is reviewed and the spoken words are transcribed to text. This transcribed text is then edited for clarity and sequence before becoming the web page text. The video is digitized so that still images or very short (5 five to ten seconds) video clips can be inserted into the text portion of the page. This process, although time consuming, lets the web production team produce an informative and educationally sound web page.

SUSTAINING TECHNICIAN EDUCATION IN THE AGE OF GLOBALIZATION

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John Dequito Mefragata, BSC***

INTRODUCTION

The coming of globalization in the 21st century has brought to fore the urgent need of quality human resources in the economic system that exists on a very essential and complementary relationship between technology and people. Realizing such urgency, in view of the very fast advances in Information Technology, the private and public colleges and universities continue to face the challenge of sustaining the educational program to produce quality and globally competitive graduates.

Labor Secretary Laguesma in a TV show (January 9, 2001) says, "Employment should be sustained despite the crisis." This puts Technological Institutions, constantly responsive and effective entities of change, whose main responsibility is to maintain the "Technician Education's" timeliness and progressive mode of curricular program, in order to produce highly employable and competitive graduates with appropriate skills and work values; graduates that serve as strong manpower to close the gap between industry and education, aid in solving the nation's economic problem by sustaining the job readiness, job relevance, and competitive advantage of technician education graduates in the "Age of Globalization" through curricular program that is adaptive to the changing need. As Santos (2000) puts it, there is, therefore a compelling need for education leaders to face the challenge of "adaptive change" or be left behind by nations, which are trailing us today.

THE OBJECTIVES OF THE STUDY

The main objective of the study is to determine the employability of technician education graduates of TUP-Taguig in terms of: **Job Readiness, Job Relevance, and Competitive Advantage**. This study answered the following specific questions: **1)** To what extent do the following **Globalization-Ready factors** facilitate learning in the Age of Globalization: 1.1) Integration of Information Technology in the curriculum; 1.2)Importance of accreditation level in Technician Education; 1.3)Quality of educational materials; and 1.4) Standards and modes of evaluation? **2)** To what extent do the respondents perceive the following sustaining factors : 2.1) **Industry-Related**: a)Extent of compliance of the company in the linkage program; b) Depth of industry exposure/ experience to sustain the Technician Education; c) Extent of task allowed to OJT/SIT students; and c) Technology type allowed for training use of OJT/SIT students? 2.2) **School-Related**: a) Curriculum: School-based subjects to meet the qualifications demanded by industry; b) Teaching quality; and c) Teaching methods and techniques? 2.3) **Student-Related**: a) Extent of development/ acquisition of knowledge; and b) Extent of acquisition of skills and work values of the technician graduates ? **3)** What is the level of employability of the technician graduates in terms of: **Job Readiness**, **Job Relevance**, and **Competitive Advantage** of the technician graduates of TUP-Taguig? **4)** Singly or in combination, which of the following variables significantly predict the employability in terms of: Job Readiness, Job Relevance, and Competitive Advantage of the technician graduates: **Globalization-Ready factors: Industry-Related, School-Related, and Student-Related?**

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Hypothesis: Singly or in combination, the following variables significantly predict the employability of technician graduates in terms of Job Readiness, Job Relevance, and Competitive Advantage: a) Globalization-Ready factors; b) Industry-Related factors; c) School-Related factors; and d) Student-Related factors.

RESEARCH METHODOLOGY. This study is descriptive. Three groups of respondents were considered: 150 technician graduates of TUP-Taguig (SY-1995-2000); 20 personnel of the industry partners, and 10 faculty coordinators of TUP-Taguig. Means were computed to describe the variables of the study. Regression analysis determined the predictors of employability of technician graduates in terms of: Job Readiness, Job Relevance, and Competitive Advantage.

SUMMARY OF FINDINGS

1. **Globalization-Ready Factors**. The three groups of respondents: industry personnel; faculty coordinators; and the technician graduates (overall mean = 4.50) considered Information Technology, a very vital tool in education in the age of globalization. Thus, they perceived that IT tools should be integrated to **"full extent"** in the technician education curriculum to cope with the global trend in education. Further, the respondents believed that access of knowledge through the IT tools, like Internets, virtual reality and other computer-aided programs serve as advantage in pursuing educational goals in this new era of the world, when gainful learning experiences, quality, and productivity are gained through the power of Information Technology. Santos (2000) emphasizes: "Finally, the ultimate evaluator of quality education through distance learning (now, "e-learning") is the market forces. Organizations and corporations who are facing global competitiveness will hire only graduates who have obtained quality and excellent education.

Moreover, **accreditation level, quality of educational materials (printed or electronic), and standards and modes of student evaluation** were considered "highly important" by the respondents. These are benchmarks that raise the quality and standard of education.

2. **Sustaining Factors**. The **Industry-Related factors,** obtained overall mean rating of 3.57, which describes "full compliance" of the participating faculty coordinator in the industry-school training program to sustain technician education. This attests the faculty coordinator's industry assistance within his field of competence, discussion of any problem of student or industry personnel, which may not be in consonance with program activities, and more importantly promotion of goodwill with the industry. The overall mean of 4.01 suggests that the technician graduates had **full industry exposure**, whose training capability provided them skills in handling machines; which was further enhanced by allowing them to perform **"often"** high and mid level industry works (overall mean = 3.80), to **"often"** use top of the line and new line model technology (overall mean = 3.85), though at times they **were allowed to use rehabilitated and old models.**

The School-Related Factors. The school had "**fully**" met the qualifications demanded by the industry through the school-based curricula-academic, laboratory, and workshop (Overall mean = 3.79). The teaching quality, with an overall mean of 3.46, suggests a **"satisfactory"** rating; with **"satisfactory"** course content (as to being up-to-date and relevant); and realization of course objective. Mastery of subject matter on the part of the technician education specialists, however, attained **"very satisfactory"** rating of 3.74. The traditional method of teaching had been **"very satisfactory**" tool in the learning of the students. However, the clamor on the use of varied **"modern teaching tools"**: use of computer-aided instruction, virtual classroom in learning workshop and laboratory activities, among others had been greatly expressed.

The Student-Related Factors. The overall mean of 3.89 describes that the technician graduates were **"fully"** conversant with the actual work environment. They **"fully"** developed appropriate work values required by the job; **"fully"** acquired productive competence in the operation, thus they were able to **"fully"** maintain machines and related equipment used in specialized technology area. The technician education sustainably provided the graduates with **high job readiness**. Thus, they were academically prepared, faced the work environment with self-confidence, more importantly, developed desirable work attitudes and skills in planning and supervision. However, the graduates had moderate skills in the use of sophisticated machines and familiarization of the new methods. Moreover, they were employed to **jobs highly relevant to their line of specialization**; which further made them **highly competitive** technician graduates.

PREDICTORS OF EMPLOYABILITY IN TERMS OF: JOB READINESS, JOB RELEVANCE, AND COMPETITIVE ADVANTAGE

The predictors of job readiness are industry exposure (Beta=.388; t= 2.97; p = .005); school-based curriculum (Beta=.327; t=2.54; p= .016); and teaching methods and techniques (Beta=.248; t=2.10; p=.043). The adjusted $\mathbf{R}^2$ value of .604 suggests that 60 percent of the variance in job readiness could be due to the three predictors. At F-value of 20.856 and .000 level of significance, the best predictor is **industry exposure.** The predictive ability of the model infers that curriculum, teaching methods and techniques, and industry exposure are vital instruments in the job readiness (an employability indicator) of the technician graduates as asserted by Mundukunanda (1998), Estrabo (1996), Aberin (1994), and Villegas (1994).

The only predictor of job relevance is **industry exposure** (Beta=.510; t=3.66; p=.001). Its predictive ability is shown in the F-value of 13.36 to about 24 percent ($\mathbf{R}^2 = .241$). This asserts the finding of Acierto (1990) that on-the-job training, which allows the trainee to experience and be exposed in industry works had high level of significant influence on job search, that is along the line of specialization.

The three predictors of competitive advantage are: Industry Exposure (Beta=.370; t=2.815; p= .008); Teaching Methods and Techniques (Beta=.308; t=2.584; p= .014); and Use of Technology (Beta=.297; t=2.386; p=.022). The predictive ability of the regression model is about 58 percent ($\mathbf{R}^2=.581$). With industry exposure as the best predictor (the F-value of 19.045 is significant at .000 level), the technician graduates' competitive advantage is also highly influenced by the use of technology, while they were exposed to industry works in their Supervised Industrial Training. As mentioned earlier the training capability of technician graduates (due to industry exposure) provided them skills in handling machines; which was further enhanced by allowing them to perform **"often"** high and mid level industry works to **"often"** use top of the line and new line model technology, though at times they **were allowed to use rehabilitated and old models.** Tucker (1998) contends: "Use of technology provides a strategic edge" (in this study competitive advantage), further emphasizing how technology had changed business design works of a firm, that had given it competitive advantage since other firms were still doing everything by hand. More importantly, the role of the teacher made the difference in a positive fashion. His/her teaching methods and techniques were influencing factors in the competitive advantage of the technician graduates, asserting Aberin's (1994) finding.

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INFORMATION TECHNOLOGY AIDED PROGRAM: ITS EFFECTS ON SELF-CONCEPT OF THE DISABLED COLLEGE STUDENTS.

Rebecca V. Purpura-Go, MA in Psychology*

INTRODUCTION

The integration of the disabled students with the rest of the students is faced with a problem on social acceptance of the disabled since an essential factor of acceptance is physical attractiveness. Being physically different from the rest will make one feel inferior thus affect self-acceptance.

This study is anchored on Carl Rogers' self-concept theory that revolves around the concept of self. His theory states that most people have considerable difficulty accepting their own true, innately positive feelings. Acceptance is difficult because as people grew up their lives are conditioned by important people to move away from positive feelings. These important people are parents, siblings, teachers, and peers who all place constraints and contingencies on ones behavior. Rogers was concerned with the environment or situation in which a person operates since an individual is exposed to numerous sources of experiences with the technological revolution included. As an individual face more complex experimental field, due to social interactions, at one point, his or her experience becomes differentiated from the rest. This differentiation leads to the concept of self or self-concept. Self-concept is the person's image of who he, should be, and might like to be. As the self-concept emerges, the individual also develops a need for what Rogers called positive regard-includes love, acceptance and approval from society. A person with a favorable conception of oneself due to experiences with society is perceived as mature, well adjusted, and fully functioning individual.

Advancement in the field of information technology is one positive experience an individual. The disabled included, may opt to go through that may result in an improved self-concept following Sullivan's theory that self-concept is learned as a function of experiences that can be taught or achieved through accumulated experiences.

The disabled are stereotyped as dependent and helpless, thus they often have low value for themselves. However, the disabled individual can be made to realized that he or she is useful in the society and capable of improving himself or herself resulting in an improved self-concept. The schema of the society that is rapidly changing due to technological advancement and moving to a new paradigm of information society and how a disabled individual can cope with the dynamic change and be not continuously left out and prejudiced. The fig shows that as a person faces complex experiences and interaction in the society, his experiences become differentiated from others. This differentiation leads to the concept of self. Further, a person's positive regard of oneself is constrained by the people in the society.

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A disabled individual maybe be subjected to an experience that may make him not different from others (people from the information society). For a disabled individual to cope with the dynamic changes in information technology make him realize his usefulness in the society, Information Technology Aided Program (ITAP) was used as an intervention, thus, enhancing his self-concept. Some of the disabled learned to cope and even go beyond their disabilities and pursued college education despite the hostile environment in school. The onset of the 21st century signaled the start of information technology revolution, the age of computers, making computer literacy a job critical skill, necessitating the integration of computer technology into the so-called traditional curriculum. Noteworthy is the presence of computer technology in almost every aspect of the present day life from the microwave to games to entertainment to military equipment to astronomy to psychology. As there is a rising need for psychologist in the rehabilitation of the physically disabled, there is likewise, a need for psychologist to understand the self-concept of this unique population and improve the same utilizing the advances in information technology.

THE PROBLEM

This study determined the effect of Information Technology Aided Program on the self-concept of the disabled college students. Specifically this study answered the following questions: 1) What is the demographic profile of the disabled college students in terms of gender and age? 2) What is the self-concept of the disabled students before and after the Information technology Aided Program. 3) Is there significant difference between the pre-test and posttest mean scores in the Researcher Constructed Self-concept Rating Scale?

METHODOLOGY

The study utilized the descriptive and experimental design particularly the pre and post test mean scores of the RCSRS design in the determination of the effect of ITAP on the self-concept of the college disabled students. The subjects of this study were 72 disabled college students for the second semester of the school yr.1999-2000 of a private university in Caloocan City. The data collected were statistically processed using the descriptive and inferential phases of statistics with the aid of Statistical package for Social Sciences (SPSS).

SUMMARY OF FINDINGS

The Profile of the Respondents: 1.a. a little more than half of the respondents are males while the females are a little less than half of the respondents (45.16% and 45.45% respectively). The proportion of male and female in both groups are almost equal indicating that disability among college students is not affected by gender. b. There were more than 18 years old and above subjects (59.38%) than the below 18 years old subjects (62%). The oldest subject is 24 years old implying that some of the subjects may have started late in going to school which could be due to their disability.2.The pre-test mean scores is 84.35 which indicates an average self-concept. The Post –test mean score 94.35 reveals high self-concept. 3. There is significant difference between the pre-test mean score and post-mean score of RSCRS which shows a marked improvement in self-concept of the subjects from average to high; denoting a positive effect of the program on the self-concept of the experimental subjects.

The Self Concept of the College Disabled Students

Based on the findings of this study that evaluated the effectiveness of ITAP in enhance the self-concept, the following conclusions were arrived at: 1.The ITAP is an effective tool in improving self-concept of the disabled students. 2.The ITAP is more effective on male disabled students than females in improving self-concept. 3.The ITAP is more effective on 18 years old and above disabled college students than those below 18 years old in improving self-concept,4.The researcher-Constructed Self-Concept Rating Scale is effective tool in measuring the self –concept of the disabled students.

RECOMMENDATIONS

1. The ITA may be used as a booster to improved the self-concept of the disabled college students. 2. The Researcher Constructed Self Concept rating Scale may be used in the determination of the level of self-concept after further validation and extensive sampling. 3. The self-concept of the non-disabled students taking computer classes may also be determined by the RCSCRS before and after the course program. 4. A similar study may be conducted for other disabled groups such as deaf-mute and blind. 5. A comparative study of the self-concept of the different disabilities may be conducted.

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Thinking Through a Training W

Phi

McCLU

We have reached the 21st Century. The basis of interac
2000) is a flashback to Marshall McCluhan (1964) – “
ownership and the sense of community that entails in ex
the same time, we need not forsake that which history
essentially derived from their interaction with the media
simple experiment. Play the classic shower stabbing scer
sound. Hmmm, not so scary after all? Indeed the inter
placidity out of the viewing audience. Same things can b
a Star Wars movie (Lucas, 1977, 1980, 1983, 1999). Yo
action. McCluhan made the same sort of comparison
churches. There are not a lot of new concepts, just new
Even better, the interactive nature of the worldwide web
intentionally scary soundtrack designed to invoke terror i

What can the users (learners/trainees, consumers, poten
when they *participate* in a website? What can a teach
maximize the interactive media's usefulness (impact)?

No longer is interactive media an occasional frill. It is a
Through the Net" (October 2000) that the majority of A
not to mention CD-ROMs and other interactive media
access. Falling Through the Net shows that as of Augus
from a 1998 usage of 26.2%. By about 2005, we can e
Internet, be it entertainment, shopping, governmental info

Creation and distribution for access and consumption of i
possess the wisdom to know reality from opinion, an

ebsite - Wisdom for Designers & Consumers

lip J. Grisé, Ph.D.

HAN RIDES AGAIN

tive technological applications within our new Age of Access (Rifkin, 'the medium is the message". Rifkin declares that we have forsaken change for renting or leasing to gain quick access to a new lifestyle. At has already taught us. Much of what media consumers experience is itself – perhaps as much so as the words of the message. Consider a ne in Alfred Hitchcock's film "Psycho" (1960) on video, but turn off the action of the multimedia, the harsh sounds, wrenched the last ounce of happen by turning the sound off on one of the many chase/fight scenes in our adrenaline is no longer pumping without the sound blended with the with the impact of Bible stories enhanced by stained glass windows in applications. We can find that the same is true with today's websites. allows it to be much more engaging and intimate than just listening to an n your heart.

tial purchasers) of 21st century multimedia come to expect or believe in er or media developer do with the planning and design of a website to

mainstream tool in school, on the job and at home. We find in "Falling merican school age children are indeed regularly exposed to the Internet, . Even the adult population has dramatically been increasing Internet t 2000, some 41.5% of American households accessed the net, up 58% xpect the majority of Americans will be obtaining information from the rmation and assistance, or just communication with one another.

nteractive media has been made so simple and prolific today. Users must d honesty from propaganda. The interplay and ownership between

print/journalism, cinema, cable television networks, ma
overlooked as a unified, controlling form of communic
Concurrently, designers need the insight, skills and res
impact of what the content presents.

Exploring fewer than a dozen major domain areas (Gri
manageable materials for individuals to use. By develo
precepts, designers and consumers can better evaluate t
whole? It all comes down to perspective and responsibil

Communication Department
The Florida State University

jor websites -- virtually all the media that touch people today is often ation. Users must be aware of the source(s) of their media knowledge. onsibility to avoid creating media that sidesteps or ignores the societal

é, 1999), interactive media designers can create solid, trustworthy and ping websites, or evaluating content of web materials based upon these e functionality of a site. Does it serve individual users and society as a ty.

Essential Features f
(And Other Intera
Phil Gr

Purpose/ Usefulness	Visual Design	Cont
Understanding the connection/ responsibility for this website to enhance the quality of life – the reality of interconnectedness A planned, goal-oriented action plan with measurable results is used to design function of piece. Have a clear definition of why site exists Designed to inform, sell, entertain, instruct, communicate, persuade, be a helpful tool Beneficial to many! Unique application of the medium/media – justification of why this interactive medium has been employed Target audience identified and site pilot-tested on a	Cite author and latest revision date for website. Have link to webmaster for comments Use only a few graphics -- max 60-75K/page; no one over 50K – for download speed. Use thumbnails Keep graphic balance simple, yet eye-catching – e.g., blurred edges on graphics Generally, use an alternate color text only for emphasis. Font color should be easy on the eye and harmonious with background Serif font offers maximum legibility Subtle – non-ugly backgrounds that don't interfere with legibility are critical. Baby boomers eyes are going fast Minimum font= 8 point, double-space text Maintain consistent style throughout site with all visual matters Provide balanced white-space using graphic design standards, & minimal text -- plenty of white space to relieve clutter Design logical progression for structure	Relevant purpose NEVER f spell chec grammar Sufficient interactive user is no passive – the mediu Warn of potentiall sensitive images fo to pre-eva Citations others' w do not pla Avoid too informatio page – co outlining subsets to Rememb pictures C convey a

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representative sample audience – and revised accordingly Provides a sense of personal control and direction while not too complex for user to understand organization and navigation Website induces action by viewer Provides incentives and rewards for repeat visitors/users (updated info, etc.) Build a reference section so that other webmasters who update "your" site know some of the ins and outs you've used as conventions Ensure that the website follows best practices of journalism – a story is being pitched. Encourage the user to be stimulated Ensure no carelessness	which contributes to purpose & reduces confusion Proximity of linking icons may indicate relative importance Consistent, non-confusing icons Provide harmonious relationship between text & background colors Use of page headers/Title to define purpose of site and assist in bookmarking Use programming checker (Dr. HTML, Webgarage, Weblint, Halsoft, etc.) Consider impact of monitor sizes and resolution setting which will invoke scroll bars Present easy to find main page with multiple links back from anywhere Include height and width parameters in HTML along with names of graphics for user download information Be compatible within ADA guidelines	thousand Include n tags in H include u identifier browsers Be sensit regional idiosyncr such as internatio dates: 2/5 or May 5 Be aware adhere to internatio laws Consider of installi search en Do not incorpora version o programs may still bugs

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STRATEGIES FOR EVALUATING AND ADOPTING A SYSTEMWIDE SOFTWARE SOLUTION

Kimberly Hardy[°*], Susie Henderson[°]

In 1996, the Florida legislature established an innovative approach for the coordination of distance learning within the community college system by establishing the Florida Community College Distance Learning Consortium (Consortium). This statewide distance learning entity has provided statewide coordination and services in such areas as policy development, infrastructure planning and development, SACS accreditation, courseware funding and licensing as well as the first statewide electronic catalog of distance learning courses and a website of resources. The Consortium coordinates the development of all facets of a technology-enhanced delivery system to ensure accessible, quality higher education programs at all 28 community colleges.

Florida has a critical need for skilled information technology workers. According to Enterprise Florida's *Strategic Plan for Florida's Economic Future, January 1, 1998 – June 30, 2003 Update,* a major area of concern is the "competitiveness of Florida's workforce." The Florida Community College System has assumed the challenge to improve and develop the technology skills of Florida's workforce.

The first step involved the Consortium obtaining a Florida legislative appropriation for the licensing of Instructional Technology curriculum in the amount of $1.5 million dollars. In order to identify the commercially available products that would meet the needs of the 28 community colleges, a subcommittee was established of six Consortium members to develop the criteria for the Request for Proposal (RFP). Committee members were selected to provide balanced representation for college size and urban or rural location. The criteria were established in the following major areas, with a total potential score of 100 points:

1. Accessibility (15 points)
    - Availability of the courses via the Internet, LAN, WAN, etc.
    - Dial-up access via a modem
    - Web-hosting options
2. Courseware (15 points)
    - Number of titles
    - Customization of courses for each school and student
    - Availability of course in other languages
    - Ease of courseware integration into existing curriculum
3. Support Services (15 points)
    - Training for the colleges on utilizing the courseware
    - Mentoring for faculty and students
    - Accessibility of updated titles and courses
    - Administrative assistance

[°] Florida Community College Distance Learning Consortium, [*] Florida State University

4. Instructional Evaluation (25 points)
    - Content of the courseware presented in a logical and well-organized manner
    - Clearly defined goals and objectives that distinctly stated learning outcomes
    - Easy to operate
    - Consistency throughout the lessons in terms of text design and layout
    - Material appropriate for the intended population
5. Implementation (25 points)
    - On-site support for colleges to install the software and make it operational
    - Length of the implementation and training period prior to offering the courseware
    - Begin contract before or after implementation and training, and correspond with the semester timeframe
6. Cost (5 points)
    - Cost per college and cost per user
    - Options for discounted pricing with an increased number of users
    - Licenses could be utilized by different users
    - Reselling licenses for corporate training

Several committee members involved additional faculty at their institution in the evaluation of the courseware. Other members reviewed the products themselves. During this initial review, the vendors were required to funnel all information through the Distance Learning Consortium and were specifically requested not to contact the committee members. Each committee member, based on their own review or additional input, ranked all seven products on the above criteria to produce a total score for each product. Those scores were added together to produce the final rankings. Four of the seven products received significantly higher total scores; the committee chose to make the top four ranked products available to the 28 colleges due to the vastly different needs at each college. The RFP stated that at least one vendor product would be chosen and was specifically worded so as not to limit the RFP to one product.

The four vendors were notified of the committee's selection. Next, the colleges were notified of their vendor/product options and were asked to evaluate and select the courseware for their colleges and request an appropriate number of licenses for one or more products. Colleges were also informed that in order to write a contract, four colleges must select a product with a minimum of 50 licenses for each college.

Each college obtained courseware access through the web to use the four vendor products and developed a final selection process to review and select one or more appropriate products. This courseware was to be used for faculty and staff training, as well as credit and non-credit courses. Several colleges throughout the state held half-day sessions where all four vendors were invited to send a representative to present their products to a regional gathering of college representatives. These sessions, aptly named a "shootout," allowed the college evaluators to make comparisons between the products and ask the sales representatives direct questions.

During this same time period, vendors were asked to determine pricing for a 20-month contract, January 1, 2001 through August 21, 2002, which would align the contracts with the academic year. This time period was selected to avoid any disruption during an academic term in case additional funding was not obtained. The other advantage to this contract period was the opportunity to request funding through two legislative sessions in Florida. Since the initial implementation period takes approximately 6 months, the longer contract period allowed the colleges sufficient time to demonstrate their success with each product before renewal.

The total cost of licenses requested by the colleges significantly exceeded the one million dollars available for the RFP. As a result, a funding formula was developed to equitably distribute these funds. A base amount of $20,000 was given to every institution plus 71 cents for each student headcount enrollment at a given institution. The amounts ranged from approximately $23,000 for our smallest colleges to $90,000 for our largest institution. Colleges were asked to submit their license requests, not to exceed the funding allocated for their institution. This involved the college president signing a commitment form that guaranteed their college would commit to at least 50 licenses for each product requested and incorporate the IT courseware into at least one credit course during the contract period.

As of April 2001, the implementation period is progressing. Colleges are realizing that small software design issues can become important considerations. For example, after licensing a product, one college discovered that students had access to an entire library of courses rather than a specific course selected for use. The college is now working with the vendor to develop a management solution

If the Consortium were to undertake this evaluation and adoption process again, there are two changes that should be implemented:

1. **Cost.** Cost as a criteria in the RFP process should be increased in point value. One product was very good, but cost three times as much as another that was also very good. Is there three times as much educational value in one product?
2. **Implementation.** Not only should implementation be reviewed as a criterion, but also the contract dates and payments should be tied to implementation at the colleges. While one vendor was quick to train colleges to use their product, two other vendors have not completed training after 100 days into the contract period.

The written Request for Proposal becomes the critical guide for the entire process. It must be a carefully developed tool. Our evaluation and adoption process, while lengthy, provided input from a committee and also from the faculty at the colleges who would be incorporating the courseware in their courses. It is absolutely essential to have buy-in from the faculty, as they know what they need. Obtaining a written commitment from the college president also provides a high level of exposure and expectation from the president that is essential for the success of a program.

HOW TO INCREASE ATTENTION USING A COMPUTER ASSISTED TEACHING PROCEDURE

J.I. Navarro, G. Ruiz, C. Alcalde, E. Marchena & M. Aguilar

Attention has effective implications on the learning at school. Because the school setting demands that children wait for turns or cues, pay attention and keep on the task, it is not surprising that many children with attention deficit have school behavioral and learning problems. Their minds are full of learning capacity, but high activity and low attention skills make learning impossible.

Computer Assisted Instruction (CAI) approach could be noted as new technology, and an useful educative tool for improving students' cognitive deficit (Alcalde, Navarro, Marchena & Ruiz, 1998). The low cost and wider computer software available for the last decade, facilitates the spread of CAI in the educational setting. Outreaching the age of text plus pictures, today's new software harnesses the full potential of multimedia: animations, video, sound and music (DuPaul & EcKert, 1998). Multimedia programming technique has potential skills to improve all processes involved in children's attention deficits. Multimedia can be considered a powerful resource that, under a systematic and managed teaching method (CAI), may be an alternative support for children with low attention competencies.

Considering this in the school setting, and the necessity of getting efficient tools to improve attention, a multimedia software was designed to increase children's cognitive attention skills. The "*How to improve your Mental Skills*" software exhibits an applicable and original project to develop cognitive skills linked with self-control, attention and concentration processes.

METHOD

A total of 155, 73 boys and 82 girls, 6th, 7th, and 8th graders, with an average age of 12.4 (sd = 0.93) years for boys, and of 12.2 (sd = 1.02) for girls, from the public school district of San Fernando-Cadiz, Spain, participated in the study. Students attention was assessed with the Perception Differences Test (Faces), and sub-test Spatial of Primary Mental Aptitude (S-PMA).

Attention training was achieved with the *"How to improve your Mental Skills"* computer program (Navarro, Alcalde, Marchena, Ruiz & Amar, 1996). This software has as its general goal to practice and develop relaxation, attention and concentration skills, facilitating control behavior in academic and personal contexts. *"How to Improve your Mental Skills"* has two sections: relaxation practice, and attention and concentration training. The attention and concentration section presents four multimedia games and progressively teaches such skills. Game performance assessment is possible after each session. Each game has three difficulty levels (easy, moderate and hard), and a range of 5 to 10 trials.

Student were randomly assigned to the experimental or control groups according to the test scores. Groups were finally adjusted in the following way: (a) Experimental Group: 51 students received 10 daily, training sessions of 20 minutes each, with the *"How to improve your Mental Skills"* software. Experimental sessions were carried out in the computer lab, and individually seated in front of the computer, they practised three trial games each. Then, scores were recorded. (b) Control-1 Group: 53 students received 10 daily training sessions of 20 minutes each with the *"Tetris"* software game. These sessions were carried out in the computer lab, and individually seated in front of the computer, they practised the game all the time. (c) Control-2 Group: 51 students did not receive any computer training. They remained in the class following the ordinary learning activities.

RESULTS AND DISCUSSION

According to descriptive statistic data (figure 1) in the Faces pre-test for Experimental Group was a mean of 29.37 (sd = 7.94); Control Group-1 mean = 30.58 (8.65); and Control Group-2 mean = 29.94 (9.25). Faces post-test data for Experimental Group: Mean = 44.49 (8.77); ControlGroup-1: Mean = 38.88 (9.88); ControlGroup-2: Mean = 35.96 (10.17). S-PMA pre-test test data for Experimental Group: Mean = 17.41 (13.27); Control Group-1: Mean = 16.18 (10.34); ControlGroup-2: Mean = 15.64 (11.02). And S-PMA post-test data were for Experimental Group: Mean = 24.9 (14.16); Control Group-1: Mean = 22.02 (11.84); ControlGroup-2: Mean = 21.86 (11.01). The post-test per group scores increase in the Faces test were: 15.19 points for Experimental Group; 8.3 for Control Group-1, and 5.75 for Control Group-2. The post-test per group scores increase in the S-PMA were: 7.94 for the Experimental Group, 5.84 for Control Group–1, and 6.22 for Control Group-2.

Statistical differences between all groups means at the Faces post-test scores were found ($F[2,145] = 10.492$; $p<0.0001$). And *a posteriori* ANOVA was calculated to know which groups evinced significant differences. Data revealed that comparisons between Experimental Group and Control Group-1 was statistically different. (Mean differences = 5.61; $p<0.017$), and Experimental Group and Control Group-2 (Mean differences = 8.80: $p<0.0001$).

Data suggests that Experimental Group significantly improved attention potential after 10 training session with the "*How to improve your Mental Skills*" specific computer software. That gain was obtained at the Faces test rather than SPMA test. Faces test is a specific test to assess the continuous attention, it would be reasonable to consider that the better scores obtained by students in the Faces test represented a continuous attention gain. Therefore, specific computer software, designed to improve attention, would be effective maintaining the attention processes.

These results admit a positive perspective for low attention skill children. Multimedia computer design constitutes another teaching support. Its versatility and easy use establishes CAI as a choice teaching approach (Howell & Navarro, 1997). The suitable practical impact to this effect would be substantial since consolidation of attention resources during childhood would reduce future learning disabilities (Roznowski, Dickter, Hong, Sawin & Shute, 2000).

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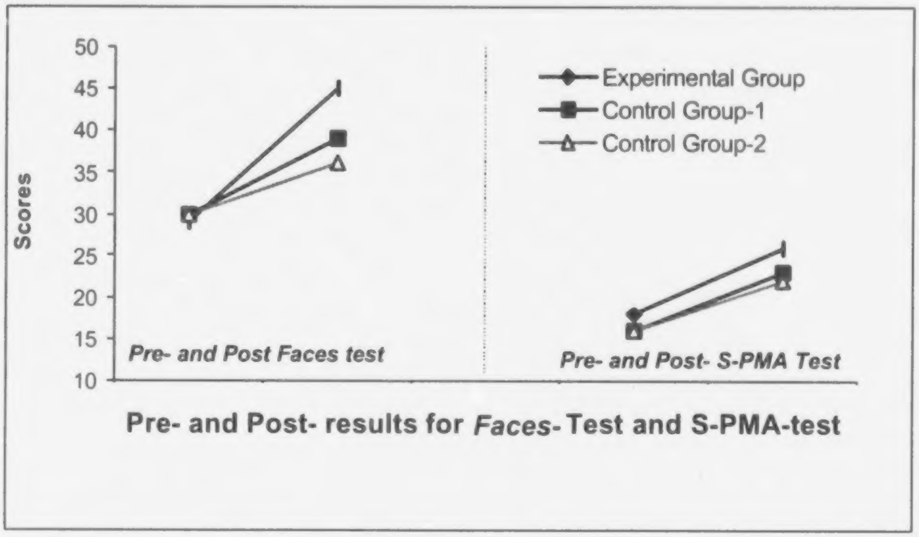
Figure 1
Pre-test and post-test experimental and control groups mean scores for Faces and S-PMA tests.



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Paper Address Presentation

HOW TO INCREASE ATTENTION USING A COMPUTER ASSISTED TEACHING PROCEDURE

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WHEN ALL THE QUICK FIXES FAIL AGAIN, TRYR&D

Robert K. Branson*

Religious groups, businessmen, politicians, presidents, and assorted zealots urge new and amazing policies and "reforms" on public education every year. Some of these policy fads are enacted into law by legislatures who fully expect them to work. The result of these frequent policy changes is that school performance does not get better; fortunately it does not get worse either.

The purpose of this presentation is to compare the education system to those of the healthcare industry and the agricultural community to see if there are lessons they have learned that might profit education.

The conclusion to be presented and defended is that education cannot get better until it uses the results of programmatic research and development (R&D) to make incremental changes in the current processes. Educators cannot avoid the difficult and deliberate R&D work that other industries must do to make fundamental improvements.

THE UPPER LIMIT HYPOTHESIS

Why does educational performance in the United States not improve year after year? After all, other sectors of society create improvements and continue to strive for new ways of approaching problems. I suppose the answer depends on whom you believe.

I believe Herrington (1995) and Hanushek (1994, 1997) who tell us that dramatic increases have been made in education funding. That these funding increases have been substantial seems to be generally accepted in the education policy community. However, few measurable improvements have been reasonably attributed to this increased funding. Lack of money is not the single problem.

To understand why funding increases have resulted in little improvement, we turn to C. S. Smith (1981) at Massachusetts Institute of Technology, who plotted the life cycles of many technologies. We believed that these same general life cycles applied to school operations (Branson, 1987, 1998). We concluded that the current *teaching-centered* model of schooling, which dominates American education, has reached the *upper limit of its potential capability*. Through dedication and years of hard work, the teachers and principals have obtained from this technology system about all it will yield.

Maybe performance is improving, but two strong public school champions published data demonstrating that performance has not improved during the past

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25 years. Berliner and Biddle (1995) provided compelling evidence supporting the upper limit hypothesis. They concluded that student performance had remained unchanged for the previous 20 years. In his annual reports to Kappan, an educator's magazine that defends the interests of public schools, Bracey (1991, 1997) reported data generally congruent with Berliner and Biddle. In a keenly dramatic conclusion, Bracey (1991) said, "The lines on a graph of average student performance are as flat as the surface of a frozen lake. Nowhere is there any evidence of a decline" (p.109). The upper limit, or asymptote, is the point of diminishing returns. American education reached that point somewhere between 1950 and 1960.

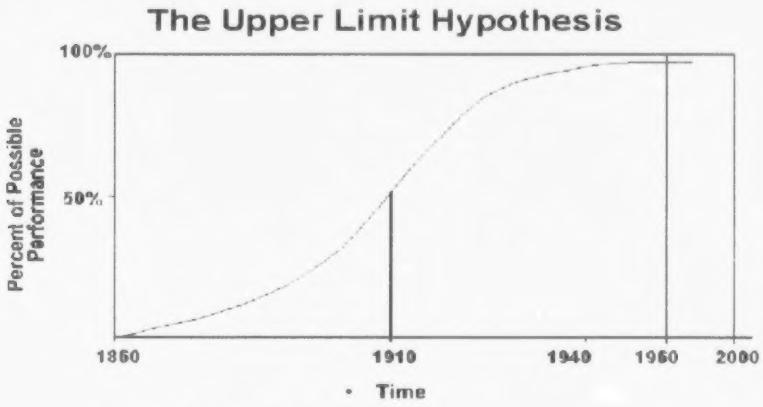

Figure 1. The hypothetical upper limit of performance in The teaching centered model of schooling

(After C. S. Smith, 1981)

Based on these research findings and analyses, we concluded that additional funding in and of itself is not a credible answer. We tried that. When we look at other well-used performances and technologies, we realize that they all have upper limits of design capability. Each of us will one day run or swim as fast as we ever will. Without a change in the operating system, our computers were limited to 640K of memory; without research in data transmission technology, we were stuck with a 300-baud modem; until the invention of antibiotics, there were few treatments for infection.

If the upper limit hypothesis is correct, and I believe that the evidence strongly supports that view, then traditional fixes, including more teachers and more money, cannot make significant improvements.

CAN ANYTHING BE DONE?

Remember that major advances in other sectors of society—medicine, agriculture, computing, and aviation— for example, were all preceded by a substantial investment in R&D. Some available educational research is of sufficient quality to contribute to improved educational processes. However, the research findings that appear to have the most promise are neither widely nor well implemented (see Berliner & Casanova, 1993).

To make significant progress in education, as penicillin did in medicine, will require three major changes:

> Fundamental redesign in schooling from the predominant teaching-centered model to a learning-centered model. Current school organization was established long before there was a science of learning and motivation.
>
> Major investment in the research and development of products and processes for schooling to make capable systems available. This research should be conducted by research institutes at the state level, much like the infrastructure for agricultural research or medical research.
>
> Cultural change within education to create demand for new products and processes based on R&D.

Every sector of society in which major gains have been made has had to go through this process. When it comes to education, politicians, parents, and policy makers all seem to believe that schooling will somehow escape the difficult, deliberate, and persistent R&D evolution that everyone else has to do. Before and after every election one hears about new schemes that simply offer more or less of the same processes that already do as well as they will ever do.

Virtually all of contemporary and historical educational research has assumed the constancy of the teaching-centered model. Perhaps because of education stakeholders, these groups share a common and vivid mental model of what school is. In other sectors, stakeholders have not all had a common experience that creates a path dependency from the past, but in education, every proposed change requires people to give up their concept about what school ought to be. Scientists had incredible difficulty stamping out the demonic and evil spirit beliefs about the cause of disease, but the germ theory ultimately prevailed in the developed world. Now education has to overcome its demons of the past as well.

As knowledge accumulates, practitioners find it increasingly difficult to be informed in all areas of research. Members of many professions realize that they must specialize or forever remain marginally informed. In most school districts, complex issues are assigned to committees of teachers. This is a fatally flawed problem solving method. It is not that selected teachers are incapable of resolving any issue; it is that they do not have time to review the literature and make well-documented decisions. Yet, many highly influential educators advocate the "teacher as everything" model, including Darling-Hammond (1990).

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BRAZILIAN SOFTWARE NEEDS FOR MULTIMEDIA MATHEMATICAL LEARNING

Joni de Almeida Amorim[1]
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INTRODUCTION

In order to create appropriate learning environments for the twenty-first century, it is imperative to have at first appropriate software. After an overview of future tendencies and the present situation of computer-based education in Brazil, this article brings some considerations about software needs in mathematical sciences. Some factors affecting cost-effectiveness of online education are: the number of students in a course; the number of courses offered; the amount of multimedia components in online courses; the amount of instructor-led interaction; the type of online education platforms; the choice of synchronous vs. asynchronous online interaction; completion rate; prohibitive Internet connection costs; and inadequate technical infrastructures (JUNG and RHA, 2000). In the case of computer based mathematical education in Brazil, maybe the two biggest cost factors are the ones related to interfaces of software (in general in any language but Portuguese) and a need of several software for several different themes of Mathematics (one license of use per computer for each software in use). This preliminary work suggests appropriate software characteristics for multimedia learning in mathematical sciences.

FUTURE TENDENCIES AND THE PRESENT SITUATION

The program "Information Society in Brazil"[3] has as one of its objectives democratize the access to information technologies and contribute to decrease the disadvantages of the country in the world market. The main goals for education are: enhancement of learning schemes, continued education and Internet based distance education and curriculum changes implementation in order to propel high quality pedagogical efficiency in all levels of education. Intending to cut costs with software licensing and in order to decrease the dependency of the Brazilian state of Rio Grande do Sul from software suppliers, the project "Free Software RS" mandates a preference for open-code software, an act that brought public schools to use in their pedagogical project the Linux platform and Sun's StarOffice in the hope to reach until the end of 2001 something like 2000 state schools (LOPES, 2001). With US$ 2,000,000,000, the United Nations intend to help poor countries to decrease the digital exclusion; nowadays only 5% of the world population is online (LA INSIGNIA, 2000). In Brazil, a project of a low cost computer prototype from the federal government intends to universalize Internet access to poor Brazilians (BRAGA and OLIVEIRA, 2001). Distance learning is booming in Brazil: the UniRede[4] consortium will be composed by at least 62 public universities and intends to reach 100,000 students per year; the project intends to offer, between others, complete undergraduation and graduation courses; training of teachers from primary and secondary level, a major problem in Brazil, is also between the priorities. The "Partnership in Global Learning"[5] is a project to develop advanced methodologies in delivering distance learning programs. Highly respected universities from Latin America and the US like UNICAMP[6] already participate in the project. By the year 2001, the initiative will be extended to include the top universities in the European and Asia/Pacific regions[7]. The Inter-American Development Bank[8] helps to accelerate economic and social development in Brazil supporting projects like IVEN - International Virtual Education Network, which was designed to develop multi-media based modules for the teaching of mathematics and science in secondary schools. Mathematics is fundamental for the development of software (JACKSON and KARKI, 2000) and there is a general consensus that a better job should be done at encouraging and preparing young people to enter technical education and careers in the new digital society (MEARES and SARGENT, 1999). In this sense, it has been indicated briefly that there are several initiatives in course in Brazil to develop education and to increase access to the new information and communication technologies; due to the importance of mathematical sciences in the preparation of an appropriate digital work-force, the following considerations about Brazilian software needs for multimedia mathematical learning are appropriate and will contribute to the debate on software development targeting the Brazilian educational market.

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BRAZILIAN NEEDS

Educational software for geometry, for example, in general stimulate students to pass through several levels of geometrical thinking: visualization, analysis, informal deduction, formal deduction e rigorous development of the problem under consideration. Traditional teaching books don't stimulate students to explore geometry in a visual way, something that discourages them to try new solutions and a better understanding. In this context, software can sometimes be more appropriate to the expression of a natural mathematical thinking allowing students to first try possibilities even by intuition and later demonstrate complex proofs in a logical manner (MISKULIN, 1999). After experimenting the usage of several different software for multimedia mathematical learning for students of different levels specially at LAPEMMEC laboratory[9] the two main cost factors related to the most commonly used software in Brazil are: the one related to the deficiencies of most interfaces of software (in general in any language but Portuguese); and the need of several software for any different theme of Mathematics (one license of use per computer for each software in use). It was detected that most students had no fluency in foreign languages which disturbed them while trying to operate most of the software; also, the high costs of buying licenses of usage for several different software, a main concern in a country with scarce resources like Brazil, are as significant as the costs of training both teachers and students in the operation of several different software, one for each theme of mathematical sciences. Also, most of those software don't generate a content that could be part of a web page easily; in most of the cases, the contents are in a format that can be opened just by the same authoring software, obligating students connecting the Internet at home to buy copies of the software of interested even if they want just to access an animation or resolution prepared by a teacher. Another problem common to most software in multimedia mathematical learning is that the user interface is not of an automatic understanding: students, in their first trial tended to get disappointed with the difficult commands necessary to accomplish very simple tasks on the screen. Intelligent and customizable user interfaces could use artificial intelligent techniques and agents to accelerate the acquaintance of users to commands in a visual environment turning the experience less frustrating. The ideal would be, in the near future, to allow both students and teachers to use voice recognition to operate educational software in a more intuitive way. This preliminary work suggests that, in Brazil, an appropriate software for multimedia learning should be customizable in order to be used both by students intending to explore mathematical concepts and by teachers intending to deliver virtual classes or activities; computer-aided software engineering should help teachers to generate multimedia mathematical content in an Internet compatible format with a minimum effort, allowing this content to be fully accessible through an Internet browser after upload delivery; the interface should be user-friendly and in Portuguese; platform independence should be also mandatory. This software should offer different modules for each theme of mathematics or related subjects and also accept modules created by eventual users.

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[5] http://grove.ufl.edu/pgl
[6] http://www.unicamp.br
[7] http://training.lucent.com
[8] http://www.iadb.org
[9] http://www.cempem.fae.unicamp.br/lapemmec

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DEVELOPING MULTIMEDIA RICH WEB COURSES

Joseph C. Roache

The effective use of technology in education can be time-consuming. The production of computer multimedia and web-based course delivery require a large investment in time and resources for the faculty. It is difficult for faculty to gather and coordinate the information and resources needed to develop and maintain meaningful distance learning courses. If faculty do begin work on a web-based course, they find it difficult to do more that to place large amounts of text on a few pages. However, with the rich possibilities of the combined elements on the web, such as, streaming audio and video, animation, virtual reality and data base connectivity -- simply placing a syllabus and some other text on the computer screen is not the most effective use of the medium.

A BRIEF HISTORY OF THE WEB

To better understand the limitations and possibilities of delivering multimedia on the web it is useful to understand how the Internet was built and first used. The Internet was originally created for U.S. defense purposes by the Advanced Research Projects Agency or ARPA of the United States Department of Defense in the late 1960s and early 1970s. In the 1980s the National Science Foundation expanded the use of ARPnet to create a network connecting supercomputing centers, universities, and research centers. The NSFnet began operation using 56Kbps dedicated telephone lines - equivalent to 56Kbps per second or about 7KB per second. By 1992 the network was upgraded to T3 lines, or 45 Mbps. This development made it possible to carry multimedia over the Internet backbone. Before this time it was not a possibility to use multimedia because multimedia on networks require high-capacity lines. In 1993, The U.S. National Center for Supercomputing applications (NCSA) released a free graphical browser for Unix systems called Mosaic. Mosaic was the first browser to use some of the elements that we associate with browsers today, the graphical user interface (GUI). The great step forward was that Mosaic provided the capability to view graphics directly in the Web page, and supported other media types, such as digital audio and animation, through applications on the client machine called helper apps. In 1994, the developers of Mosaic left the NCSA, and formed a company called Netscape Communications Corporation. In 1995, the NSF relinquished control of the network to commercial providers, which meant that commercial use was now acceptable. In 1995, Netscape Web browser, called Navigator became the most popular browser on the Web, in 1996 Microsoft entered the browser business with Internet Explorer. Both companies have provided support for multimedia data types such as; support for embedded Apple QuickTime movies and digital video, digital audio and three-dimensional virtual reality environments. Another major development in 1995-96 was the ability to incorporate Java applets in Web browsers and the widespread adoption of the Java programming language. Java applets are small programs that can be embedded in a Web page and downloaded and run on the users machine.

MULTIMEDIA ON THE WEB

Multimedia on individual computers or over the Web generally refers to the integration of text, graphics, audio, video and animation, such as embedding video, sound or VRML (virtual reality markup language) in a Web page. Also, there is the added possibility of the use of interactivity. Interactivity gives the viewer the capability of manipulating the features of the media being used. For example, with VRML animation the viewer can move around in a 3D environment or interact with the environment -- in a video embedded on a Web page the viewer can play, pause, rewind and change the volume of the video. Web browsers display multimedia content in three basic ways: 1) Native, inline - media that can be displayed directly on the web page without any added programs or viewers. For example, all graphical browsers support GIF graphics and many support JPEG graphics, therefore these graphics can be written directly into the HTML code. 2) Helper applications - this was the standard method of viewing multimedia on the Web in the early development. Multimedia content is downloaded to the viewers hard disk and then it is displayed in a separate player application, such as a MoviePlayer. 3) Inline with external code modules - For example Netscape compatible Plug-Ins or Java applets or Internet Explorer's OLE/ActiveX. These external so-called "mini-programs" enable the viewer to play back multimedia content directly on the Web page.

THE NETWORK AND CONNECTIVITY

Faculty that decide to produce multimedia content for their Web courses have to be concerned about another factor that is largely out of their control. However being aware of the ramifications of connectivity and bandwidth are needed. One of the largest roadblocks to delivering rich multimedia content on the Web is the time it takes for media to download. This download time can be effected by the size of the media that is used and therefore the smaller the content size the quicker the download. However, there types of media that can enhance a Web course will be much larger that simple text and photos. Although some multimedia display capacity, such as JPG compression and video playback from the hard disk are dependent on the speed and power of the viewers computer, the main limiting factor for multimedia on the web is long download times. Streaming technologies address this problem by enabling playback to begin before the download is complete. So because the top priority for producing multimedia content for the web is keeping the file sizes to a minimum to reduce the download time producers must balance between reduction in media quality and time of delivery.

STEAMING CONTENT

Streaming is the continuous delivery of time-based media, such as video, audio and animation to a client machine in real-time. The good thing about streaming is that the user doesn't have to wait for the file to be completely downloaded before viewing the content. The remaining portion of the file is downloaded from the server in the background while the media plays on the client machine. Because the Internet was not designed to deliver continuous, synchronized, time-based data delivering streaming content can be tricky. Internet data is packet-based, which means it is sent asynchronously in discontinuous chunks. The system can not know when each discrete chunk of material will arrive at its destination, each chunk will bounce around the Internet looking for the best path until it finds the right one. This is why there is sometimes on slower connections stutters and gaps during playback. Usually a dedicated file server with proprietary software is needed to implement continuous playback.

CONCLUSION

The use of multimedia to enhance and illustrate web-based distance learning courses is not a frill it is the way to produce effective new courses. It is therefore important for faculty to not only understand the concepts behind the development of multimedia but to also have a good grasp of how to implement some of the processes involved with production. However, it would be unwise to believe that individual faculty can have the time or all of the tools to create everything needed for their courses. The model that will probably be the most successful is a team approach where faculty, student, staff and consultants work together to produce the finished product. This calls for a great deal of cooperation and planning but can be achieved when all parties are used most effectively. The process will work basically as follows: 1) students will be trained in the various software application needed to produce the kinds of media wanted, 2) faculty members will provide the subject matter for course, and 3) a team of faculty will be recruited as consultants in fields such as, Instructional Design, Curriculum Development and Assessment to ensure the instructional soundness of the course. This model can be used to make the job of creating a multimedia rich course easier and more effective.

THE INFLUENCE OF DATA-COLLECTION DEVICES ON STUDENT UNDERSTANDING OF THE CONCEPT OF FUNCTION

Robert Mann

BACKGROUND AND PURPOSE

The concept of function is of critical importance in mathematics. Often taught for the first time in algebra, functions are revisited in advanced algebra and become the focal point of pre-calculus. A thorough understanding of the concept of function is then essential for success in calculus, differential equations and beyond. As early as 1930, the notion of function was referred to as the "keynote of Western culture" (Schaaf, 500). More recently, the National Council of Teachers of Mathematics has declared that the function concept should be the central organizing principle for secondary and higher mathematics (NCTM 1989).

The importance of the concept of function is also reflected in the large amount of literature devoted to this topic. In particular, the research on student understanding of the concept of function is vast and diverse (see Breidenbach, D. et. al, Eisenberg, T. & Dreyfus, T., Ponte, J. P., Thompson, P.W., Vinner, S. & Dreyfus, T.). Recently, several studies have examined the influence of graphing calculators and similar instruments on student learning in mathematics. Adams, Dunham & Dick, O'Callaghan, and Park have all reached similar conclusions in regard to the impact of these graphing devices upon student understanding of function. Their research has indicated that the use of graphing software facilitates a deeper conceptual understanding of function without hindering student performance on related procedural tasks.

These and similar studies have supported the use of graphing technology in the secondary and post-secondary classrooms and many students now study courses like Advanced Algebra and Calculus with the aid of these familiar devices. As the use of the graphing technology has grown, so too has the use of compatible data collection devices such as the Calculator Based Laboratory (CBL) and Calculator Based Ranger (CBR), both products of Texas Instruments. These devices and others like them allow students to quickly gather data on height, distance, time, volume, pressure, temperature, and several other variables. This data can then be transferred to a graphing calculator for further investigation and analysis. The functionality, portability, and relatively low expense of these data collection devices has made them popular in both science and math classrooms.

Despite the growing popularity of these data-collection devices, little research exists on the effect of these instruments upon student understanding. The purpose of this study then is to examine the influence of these data-collection devices on students' understanding of the concept of function.

Robert Mann is an assistant professor of Mathematics at Western Illinois University. The information provided here is summarized from his Ph.D. dissertation completed at the University of Nebraska-Lincoln in December of 2000. This document should be referenced for further details regarding the study.

METHODOLOY

The subjects of this study are all students at a large Midwestern high school. The experimental group is composed of students from a senior level Interdisciplinary Math and Science course which made extensive use of the CBRs, CBLs, and graphing calculators. The control group is made up of representative peers from several pre-calculus sections in the high school. Both groups were exposed to the same function-based curriculum in their courses and both groups were taught with the aid of a graphing calculator (specifically, the TI 83). Many of the students from both groups also had the same mathematics instructor. However, only those in the Interdisciplinary course were given the opportunity to collect real world data by using the CBLs and CBRs.

How did the addition of these data-collection devices affect the mathematical learning of these students? In particular, did the ability to use these instruments influence the students' understanding of the concept of function? Did the application of these devices have any impact upon the procedural skill of these students? This research seeks to provide answers to those questions.

The thirteen students from the Interdisciplinary course were compared to their thirteen peers from the traditional pre-calculus sections using two forms of assessment. One instrument required the students to construct a concept map for the concept of function. The role of concept maps in assessing mathematical understanding can be further studied in Williams (1998). These concept maps were then scored by three independent evaluators using a rubric established by Mann (p. 105-108). The students were also given a small traditional exam consisting of questions typically seen on the pre-calculus final. The intent was to compare both their conceptual and procedural understanding of functions.

RESULTS

The concept map results indicate that the students with access to the CBLs and CBRs had significantly ($p<.05$) higher scores on the concept maps than their pre-calculus counterparts.

Table 1.1 Concept Map Summary Statistics

	Number	Mean	Standard Deviation
ADAGE	13	79.2	15.2
Pre-calculus	13	69.1	13.7

The results from the traditional function exam reveal that there was not a significant ($p>.05$) difference in the procedural skills of the students.

Table 2.1 Function Evaluation Summary Statistics

	Number	Mean	Standard Deviation
ADAGE	13	27.7	10.9
Pre-calculus	13	29.5	5.8

The general conclusion is that students who used the CBLs and CBRs on a regular basis developed a richer conceptual understanding of function than their peers who used only the graphing calculators, In addition, these students were able to achieve this deeper conceptual understanding without sacrificing valuable procedural knowledge. This researcher believes that this enriched conceptual understanding can be attributed to the ability of the CBLs and CBRs to expose the students to real data, real analysis, and real applications of mathematical functions.

The results from this small study are not enough to conclude that data collection devices should be a part of every pre-calculus classroom. However, the findings do indicate that these instruments have a positive influence on student understanding of the concept of function and that more research should be dedicated to the further examination of the role and impact of data collection devices in the math classroom.

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Theme: TECHNOLOGY RESOURCES IN SUPPORT OF TEACHING

Titel: USING LEGO DACTA TECHNOLOGY AS AN AGENT FOR PROBLEM SOLVING

Author: Ann-Charlotte Markman

BACKGROUND

Rösjöschool is situated in a suburb of Stockholm, Sweden. Our pupils are between 6 and 12 years old and there are about 375 pupils in the school.

The suburb was built in the late –50´s and most children live in apartments. Almost 50% of our children are from imigrant or refugee families and have Swedish as an additional language. In the last few years Rösjöschool has been chosen by families from other areas and 10% of our pupils are now travelling each day to get to our school.

One of the reasons our school is chosen is because of the teaching of technology and the computer skills children achieve. Our pupils have access to computer and Internet. They work in programs like MS Word, PP and Publisher. They all have their own e-mail address and good connection to the Internet. They know how to scan in a picture and they can use digital cameras.

LEGO DACTA PROJECT

Sweden is a country, where computerskills are highly wanted. Schools in Sweden can´t educate enough engineers to our industries. To be good in technology is a ticket to higher education and to a good job and living. We want to give our kids that opportunity. One way to achieve that aim is to use Lego Dacta as an agent for problem solving.

Lego Dacta is a material in technology education. Children learn how to build models and include sensors. They then connect the model to a computur by an inter fall cabel. With help of icons they can make a program that make the model work the way they want it to. We have used this material for a couple of years.

AIMS AND OBJECTIVES

1 We will integrate learning through

- A design process requiring student problem solving activities
- Activity based and project driven modules
- Learning by Doing (Hands On)
- Independent and Small Group Activity

2 Develop teacher and peer evaluation

3 Ensure that set of outcomes for this technology project is concerned with pupils in school developing and understanding of the evolution of technology – technology as a product, technology as a creative process and technology as an activity that is related to other disciplines.

4 We wanted to find out if a child learn a strategy to solve a problem like make a robot move the way the child wants – is it possible to use that problem solving strategy to other similar situations?

We wanted children to

- be aware of "real-life" contexts in which subject based knowledge and techniques are used, and be able to analyse appropriate problems using them
- be able to communicate, in appropriate media, the outcome of such an analysis
- be aware of the benefits and problems of working with others in a group
- be able to acquire a range of "transferable skills"
- be challenged to the limits of their abilities, for that is when optimal learning occurs
- all benefit from the experience

All children in year 5 and 6 had the opportunity to make simple set models and connect that model to a computer to make it move.

Those who wanted could apply to an after school technology class. Boys and girls in separated groups. Each class (10-12 pupils) divided in smaller groups of 3. They were exposed to a problem. We wanted to give problems they could find in every day life.

We wanted the children to

- Research a particular problem
- Design and make models
- Use system components to design and build machines
- Report on a particular problem
- Evaluate and report the results of design solutions

The Lego Dacta gives inspiration and is easy enough for the children to use. They connect their built creation to a Lap Top and the language they use is a symbol language, that enable them to do it without being experts in English, which is the language for most computer programs in Sweden.

Each child kept a diary, where they recorded their work, the discussions with fellows and staff and experiences they made. The teachers made the same. They wrote down when and why they gave help.

In the end of the project the children inivited family and friends for an exhibition, where they told about their invention, their struggles and the outcome and showed their models. Part of their work was published on our homepage.

This project gave not only the participant children a but also the whole school a bigger interest for Educational Engineering.

The way for an idea to be physicly is over a computerscreen.

- To visual what you think
- To make what you think visual
- Will the robot do what you wanted it to – what you thought it would
  Probably not the first time. A conceptuelle conflict between what you think will happen and what happens

The project was also a teacher training project

- to identify particular pedagogical factors and aspects of teachers´choices in deciding when, and when not to intervene in offering additional information which might be linked with increased pupil attainment
- Knowing what to teach knowledge/principles
- Understanding pupils
- Knowing how to present the problems and content to pupils
- Bringing about change
- Teaching behaviours – lesson clarity, instructional variety, teacher task orientation engagement in the learning process

CONCLUSION

By letting the pupils use their creativity in an interactive learning environment we hope to increase their interest in technology, for now and for future education. We hope they will choose science and technology and become the engineers and etrepreneurs Sweden need.

Learning together in discussion and intervention and by asking questions, guided by a teacher make a child construct new knowledge (Vygotskij).

A LEARNING-CENTERED APPROACH TO COURSEWORK & TEACHING EVALUATION IN ENGINEERING CLASSES

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Student evaluation of teaching has served as the primary means of evaluating instruction in university classes for some time and considerable controversy has surrounded their use, especially when providing input into reappointment, tenure, promotion and merit pay decisions for individual instructors (d'Apollonia & Abrami, 1997; Marsh; 1987; Sproule, 2000; Starry, Derry, & Wright, 1973). The literature is a mix of arguments, generally not grounded in empirical research, reflecting positive (cf. d'Apollonia & Abrami, 1997; Marsh, 1987) and negative (Haskell, 1997) rhetoric regarding the use of student ratings to evaluate "teaching effectiveness." Studies that have been completed provide considerable support for factors other than student learning influencing evaluations in university courses. More recently, perhaps in response to perceived shortcomings of the current system, a concurrent peer evaluation component based on classroom observations by faculty peers has been added as a supplement to student evaluation at some institutions. All of this has led to a labor intensive and yet a fundamentally subjective process whose relevance as an indicator of the actual knowledge gain by students is yet to established.

This work has focused on a learning-centered approach to the evaluation of teaching. The work was motivated by the concerns over the confusion, inconsistencies and lack of empirical investigation of alternative practices evident in the literature and the genuine belief that there is a better way to evaluate instruction, i.e., one based on the actual knowledge gained by the students judged against a set of established criteria for any given course. Standardized tests were developed suitable for measuring the content knowledge of students in several undergraduate engineering courses. Evaluation of each course was conducted using two systems of assessment: the traditional student questionnaire feedback system and one based on the learning-centered approach using a comprehensive question bank and content knowledge testing. The goal was to critically assess the effectiveness of the learning-centered approach in relation to the current subjective form of student evaluation in a test pool of engineering classes. The following questions were central to the effort:

1. To what extent can measures of content knowledge be developed for use in evaluating the effectiveness of classroom instruction?
2. To what extent do these measures represent valid and reliable growth in content knowledge of students?
3. To what extent student evaluations of teaching relate to learning as measured by growth in content knowledge?

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METHOD

Students in selected engineering classes at a medium-sized state university in the southeast participated in the study. For the most part, students were in their second and third years and for one course in the fourth year of post-secondary education. No selective conditions other than the satisfaction of the prerequisite and co-requisite requirements were imposed on their enrollment in the courses. As is the case with analyses of traditional student evaluation data, no attempt was made to differentiate or describe groups of respondents except by section of course enrollment.

Six courses covering three different disciplinary areas in engineering (Civil, Electrical and Mechanical Engineering) were chosen to test the generality of the approach and to involve faculty from different content areas in the effort. Results for three of these courses for which data analyses have been completed are reported in this paper. Course evaluation was conducted using two systems of assessment: that based on the proposed learning-centered approach (pretest/ posttest of content knowledge) and the traditional student questionnaire feedback system. The first part of the assessment was aimed at measuring growth in student learning using a set of questions from a test bank specially developed for this purpose by a team of faculty members assigned to the course. In preparing the test bank, faculty used course syllabus and topical objectives as the guide and sought information and counsel from various relevant sources including other faculty colleagues and professionals knowledgeable about the subject matter at external institutions, as needed.

The student opinion questionnaire was patterned after the "cafeteria of evaluation" survey tool, which has been widely used in universities across the country since its introduction in the 70's (cf. Starry, Derry, & Wright, 1973, p. 62). The course and instructor appraisal system used in this research was based on a structured method for collecting student opinions about the quality of instruction from their perspective. Ratings on the questionnaire were based on a 5-point Likert-type scale (1=Strongly Agree, 2=Agree, 3=Undecided, 4=Disagree, 5=Strongly Disagree). Twenty-three items were combined for an overall rating. Three cluster ratings were derived from the original items each reflecting a different aspect of the overall rating. These included course (11), instructor (7), and general (5) evaluation items.

RESULTS

The results for the three courses, identified below as Course #1, #2 and #3, respectively, are as follows: For Course #1, the pretest mean was 14.04 ($SD=10.49$) and ranged from 0% to 45% correct; the posttest mean was 70.20 ($SD=12.55$) with a range of 44% to 89% correct. There was a statistically significant difference between the pretest and posttest ($t=16.90$, $p<0.01$). The magnitude of difference was large ($d=4.88$). For Course #2, the pretest mean was 9.33 ($SD=5.96$) and ranged from 0% to 33% correct. The posttest mean was 45.33 ($SD=5.58$) with a range of 40% to 53% correct. There was a statistically significant difference between the pretest and posttest ($t=7.96$, $p<0.01$). The magnitude of difference was large ($d=6.24$). For Course #3, twenty-nine students completed the pretest, posttest, and course evaluation. Pretest performance ($M=9.56$, $SD=7.62$) for this group was significantly lower ($t=20.48$, $df=28$, $p<0.05$) than posttest performance ($M=68.44$, $SD=13.69$). The magnitude of the improvement (50.88%) was large ($d=4.78$). The relationship between pretest and posttest scores was very low ($r_{xy}=0.03$, $p>0.05$) suggesting that learning changes were not merely reflections of good students improving already high content knowledge scores. Course evaluations represented uniformly positive opinions regarding the course ($M=1.98$, $SD=0.50$), instructor ($M=1.88$, $SD=0.58$), general ($M=2.30$, $SD=0.78$), and overall ($M=2.02$, $SD=0.54$) ratings of instruction in Course #3. Low, non-significant correlation was indicated between performance assessments and students' ratings of the course ($r_{xy}=-0.31$), instructor ($r_{xy}=-0.20$), and general ($r_{xy}=-0.24$) item sub-scales and for the overall ($r_{xy}=-0.27$) ratings.

CONCLUSIONS

Our work supports two views: Current system of evaluation of teaching and, by inference, of course quality are based on questionable premises, and alternative practices grounded in student performance appraisals constitute a practical means of evaluation and offer considerable hope in reforming the system. Sproule (2000) argues that the system of evaluating university teaching is intractable for political, philosophical, and pseudo-scientific reasons; however, the winds of change blow stronger with increasing empirical support for the lack of correspondence between learning as measured by improvement in course content knowledge and student ratings of teaching effectiveness.

ACKNOWLEDGEMENT

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USING XML AND XSL-T TO PRODUCE AND MAINTAIN COURSES ON THE WEB

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The CNAM "Conservatoire National des Arts et Métiers" is an university created in Paris in late XVIII century, at the end of the French revolution. Since its opening, CNAM is explicitly dedicated only to continuous education. It organization was already quite novative : courses take place only at night so that workers may freely attend without conflicting with their professional activity. More than two hundred years later, the CNAM still is the premier French university concerned with continuous education (http://www.cnam.fr).

The usability of internet and the cheapness of home computers is causing a drastic change in continuous education. New technologies make distant learning really usable by anyone now. As a consequence, CNAM has initiated a large program to develop courses on the web, and to make them available to registered students on the CNAM private web portal.

In parallel to the effort to adapt the pedagogy and the course contents to the new technology, several studies and experiments are conducted to improve the efficiency of web courses development. Mastering new technologies for developing higher quality courses on the web at a lower cost obviously is a very important challenge for CNAM.

The experiment

Developing courses on leading edge of technology and on fast evolving domains has some specific constraints : such courses require a yearly maintenance to keep their contents up to date in order to remain valuable and attractive. The development of a course on "HCI (Human Computer Interaction)", a very fast evolving domain, is a wonderful test-bed for experimenting, improving and mastering new technologies for automated course production and maintenance. The used technology aims at providing reliable solutions to preserve the investment of a course development for the long term. The low cost maintainability of the course is one of the major topics of the experiment.

Background: Designing a document for distant learning is far different from preparing an *ex-cathedra* course or even from writing a book. Since the teacher is not present when the student is learning, she must take care of supplying in digital format all informations and the rhetoric which usually is transmitted by voice and corporal expressions. Beyond rhetoric, mastering consistent typography and interaction techniques is required to produce attractive and valuable e-documents.

The process which turns a course into an e-course cannot be reduced to the simple translation of documents, initially designed for print, into HTML and Java code. E-courses documents have to be designed especially for that purpose. Two categories of people have to cooperate : the author who owns the knowledge and masters the rhetoric to deliver it, and the developer who is aware of the web development technology and of cognitive aspects of typography and interaction. Unfortunately, both skills are rarely present at the top level within a single person. This leads web designers and teachers to collaborate intensively. Thereby, a complex task of coordination between them is required. The structure of the web site is usually designed jointly by teachers and designers, whilst the actual HTML and Java coding

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is done by the developer. Since all these tasks are performed manually, any late change either in the e-course design in terms of structure, of look, or even of interaction is extremely costly. For instance a deep layout change leads to edit the whole page set. For the same reason, maintenance of the e-document is a heavy budget line if some parts of a course need to be yearly upgraded, such as it occurs in courses about new technologies.

Principles of XML and XSLT approach

The HTML page maintenance problem is not specific to e-learning. It concerns Web technologies as such. Thereby, solutions have been proposed by the W3C, the "World Wide Web Consortium", as early as 1996. XML, "the Extensible Markup Language", (http://w3.org) and some of its associated languages XSLT, SVG and SMIL, drastically reduce both the production and maintenance costs of web sites. Today, XML is already a well admitted standard. It is fully supported by navigators such as Netscape and IE5. Tools for XML and XSL based production of HTML pages are available on the marketplace.

The underlying principle is quite simple: XML, as its name suggests it, is an extensible language whose purpose is precisely to define target application dedicated languages, for instance a language for describing courses. Such a language can be made as simple as wished and easy to use by novices. Since the language tags can be freely chosen by the teacher to denote the abstractions she handles within the course, she has nothing more to do with the boring HTML tags, and can focus on her own expertise.

Nevertheless, for portability reasons and for usability on old browsers, it still is suitable that the actual web pages be coded into HTML. To do so, we use a second XML based language called XSLT. It is used to describe, once for all, how the teacher defined abstractions, which occur in the XML coding of the course contents, are to be translated into HTML. It releases from the burden of coding each page in HTML. To generate the whole set of pages of the course, an automata takes as input, on the one hand, the translation rules described in XSLT, "the Extensible Stylesheet Language Transformation", (http://w3.org), and, on the other hand, the course source files described in a XML compliant private language. As a consequence the two partners now have a simple and consistent way for interacting : the teacher delivers XML files and the designer delivers XSLT translation rules.

By providing a methodological support which clearly separate the roles, each of the partner can work independently, each with her own expertize, without interference. On the one side, the author may add, at will, any new contents to the course or reorganize it. With respect to the XML based course description language, one has just to run the translator to get the updated set of HTML pages. On the other side, the designer can improve, at will, the design and specify better HTML translation without interacting with the course contents. Each of such changes are automatically reported wherever the associated abstractions are used.

Practical application of XML XSL for the HCI course development.

On the author's side: The previous organization has been enhanced to provide better comfort to the teacher who produces the course contents. Since teachers are more used to edit documents with texts editors such as MS Word rather than with structured XML editors, or even with authoring tools, we have added a preliminary step to enable the author to go on editing the contents with her familiar tools. A simpler tagging language syntax has been defined. Such tags are directly placed within Word documents. A preprocessor automatically converts this language into XML. Thereby, the author has not to be aware of XML syntax, and preserves her own way of working. For instance, she may, still use MS Word spelling and grammar tools to check the source files before production.

The preprocessor takes advantage of this pass to break down the contents into the targeted Web site pages structure, and to prepare the navigation structure. For instance, it automatically prepares some specific XML code later used to elaborate list of definitions, cross references, indexes, tables of contents, and links from words to their definitions. Since the pre-processor processes the whole set of sources files, any addition is automatically taken into consideration. For instance when the author adds a new definition somewhere in the course, the indexes and cross references are automatically updated with no more effort. For instance, to do it, the author has just to insert a *"$def"* tag just before the sentence which contains the concerned definition.

The pre-processor makes the markup syntax lighter for the author by suppressing the XML explicit hierarchical structure notation based on "slash tags", and thereby reserves the source text readability. Starting from simply taged text also provides a cheap reverse engineering technique for turning paper based courses into well strcutured and interactive Web courses. It also provides a reverse engineering technique for turning paper based courses into well strcutured and interactive Web courses.

On the designer's side: Since the development stage is fully automated, a larger part of the budget can be invested into the design. Instead of developing pages, the designer focus on generic page models. She has just to prepare, once for all, the HTML code for each constituent of the models and to place it into the XSLT templates as translation of the XML structure. Since the designer's task can be performed without working on the actual content, the production schedule can be tighter, each of the partners works in parallel. Furthermore, experimental feedback can be taken into account at nearly no cost : whenever a flaw, even a minor one, is observed in the design, the designer has just to fix it in the model description. Only a few minutes are necessary to consistently upgrade hundreds of pages in the Web site, and one can be sure that all occurrences are correctly updated since all the pages are re-generated according to the updated models.

In this approach production and maintenance are not distinct. One may easily start evaluating the course and improving its quality far before the production is over, thereby quickly integrating the impact of the growing know-how of the development team into the product. The well know drawback of the classical "specify first then do" approaches, where it is often too late and too costly to fix minor flaws once they become visible, completely disappears with this technique. Taking student feedback into account is quite easy and inexpensive.

Conclusion

Using jointly XML and XSLT enable to clearly separate the course content production from its transformation into a set of well organized and well presented interactive HTML pages.
The designer focuses on generic pages models to improve the overall consistency and to organize the navigation structure according to pedagogic choices. The author can fully focus on her expertise do design contents and rhetoric without being hampered by page layout considerations. The automated generation process ensures a reliable target document fully in conformity with the defined models. Using XML and XSL-T to separate contents from presentation makes contents elaboration easier and production simpler, cheaper, faster and the overall more consistent.

MULTIMEDIA LEARNING: A NEW PARADIGM IN EDUCATION

by Ms. Neo Mai[*] and Mr. Ken Neo TK[*]

ABSTRACT

Since the PC (personal computer) was first introduced in the 1970s, its processing power has progressed by leaps and bounds. The PC is now able to process the multimedia elements as well as become a communication device. With this advancement, the Information and Communication Technology (ICT), particularly the multimedia technology, has rapidly permeated and increasingly altered the landscape in the educational arena. In this paper, we focus on using multimedia as a strategic instructional media and the infusion of ICT and the multimedia technology into education which has created an impact on the traditional instructional communication process (ICP). This has led to a new paradigm in education and the evolution of new concepts in content development and a number of innovative methods in which information can be communicated to the learners. This new learning environment will undoubtedly influence the way teachers teach and students learn.

INTRODUCTION

The ICT (Information and Communication Technology) revolution is fast changing the world, and creating a generation that is media-hungry and technologically savvy. This new generation is using digital media for learning and communicating (Tapscott, 1998). Business, industry, the military and educational institutions have recognised this potential and used computers as instructional tools. However, in the context of education, technology also refers to the process of applying the tools for educational purposes. In other words, "educational technology is a combination of the processes and tools involved in addressing educational needs and problems, with an emphasis on applying the most current tools: computers and their related technologies" (Roblyer and Edwards, 2000).

The advent of multimedia and multimedia technologies has changed the way educators teach and students learn. With multimedia, the communication of the information can be done in a more effective manner and it can be an effective instructional medium for delivering information. Multimedia application design offers new insights into the learning process of the designer and forces him or her to represent information and knowledge in a new and innovative way (Neo and Neo, 2000). The use of multimedia as a platform for teaching is made even more possible with the availability of the MPCs (Multimedia PCs) that are powerful, fast, and able to process all media elements effortlessly and quickly, and multimedia software packages that are user-friendly yet power-packed.

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Multimedia "provides a means to supplement a presenter's efforts to garner attention, increase retention, improve comprehension, and to bring an audience into agreement", which consequently results in people remembering 20% of what they see, 40% of what they see and hear, but about 75% of what they see and hear and do simultaneously (Lindstrom 1994).

MULTIMEDIA AS A TEACHING AND LEARNING TOOL

In the traditional information communication process (ICP), the teacher is the source of the knowledge and presents the knowledge to the students, who are in turn, passive receivers of the information. With multimedia, the communication of the information can be done in a more effective manner and it can be an effective instructional medium for delivering educational information. This is because it enables the teacher to represent the information in various media, i.e., via sound, text, animation, video and images. With multimedia, the teacher is now the director of the knowledge and can use the various combinations of media elements to create interactive educational content. The result is a stimulating environment for learning and retaining the information delivered. The marriage of content and multimedia technology results in interactive multimedia materials which can be delivered to the students in teacher-centered, student-centered, or mixed teaching and learning modes (Figure 1).

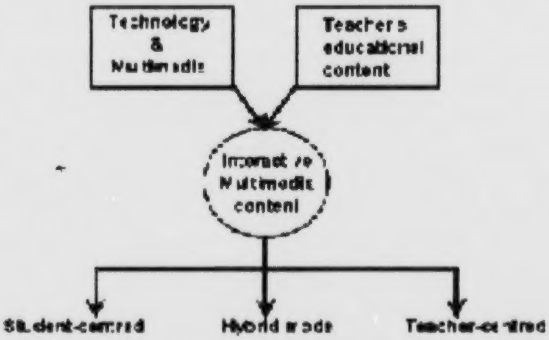

Figure 1. Using multimedia to represent content and delivering via various methods

In the teacher-centered mode, the teacher is the one in control of the information that is received by the students and is responsible for how much information is being disseminated to them. The teacher-centred methods include presentations and demonstrations to process the information. Students are also able to retain and recall the information as well as obtain mastery in the subject matter with drills and practices, and tutorials, which are highly interactive. The multimedia courseware can also be packaged on the CD-ROM and delivered in a networked classroom leading to a teacher-centered mode where the courseware is opened on their PCs and the students follow the teacher's lecture on their PCs.

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In the student-centered method, the students construct their own knowledge and bring their authentic experiences into the learning process with the teacher as the facilitator. The multimedia courseware content can also be packaged as a Web file and delivered on the Internet in a Web browser can result in online courses where the students access the courseware from a browser on their PCs. The student is then free to engage in learning on his or her own time and pace, and consequently, the learning mode is student-centered. This multimedia material can be used to foster team-processing and active learning as with collaborative and cooperative methods. This encourages higher-level learning, increases comprehension and retention rates, and focuses on the total development of the student in self-accessed and self-directed learning.

In the mixed mode, the teacher has the flexibility to incorporate the two teaching and learning approaches whenever they deem them useful, to increase and enhance their students' learning processes. Here, the same multimedia courseware content can also be packaged and delivered over satellite and broadband technologies for distance learning. Here, the student learns the materials on his or her own time and pace, and interacts with the teacher via video-conferencing in real-time.

CONCLUSION

There is little doubt that the changing role of education is currenly being reinforced with the integration of multimedia technologies. This has led to a new paradigm in education and the evolution of new concepts in content development and a number of innovative methods in which information can be communicated to the learners. This new learning environment will undoubtedly influence the way teachers teach and students learn.

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TECHNOLOGY-BASED LEARNING: USING WEB AUTHORING TOOLS TO ENHANCE INSTRUCTION IN THE CLASSROOM

Mr. Ken Neo TK & Ms. Neo Mai

ABSTRACT

In recent years, many institutions of higher learning are rapidly moving towards integrating technology particularly the Information and Communication Technology (ICT) into the classroom. In this paper, we focus on a course in the Faculty of Creative Multimedia, in which students will learn the web-based multimedia authoring tools such as Macromedia Dreamweaver and Flash and then apply them to solve a problem on the web. In this course, the students, organised into small groups, will find an existing web site of their choice, make a critical analysis of its weaknesses and then reconstruct the site by using the multimedia authoring tools which will empower them to make the web site more media-rich and interactive. The purpose of the project is to inculcate into the students critical thinking, problem-solving, designing and collaborative skills. An online interview was carried out on the Internet chat-room and the students' comments will be discussed.

INTRODUCTION

Malaysia has taken on a firm step towards establishing an Information-rich society. With the setting up of the Multimedia SuperCorridor or the MSC, Malaysia will be linked electronically to the world. At the heart of the Multimedia SuperCorridor is the Multimedia University in Cyberjaya. The University was built to provide multimedia and related courses of education with the setting up of the Faculty of Creative Multimedia. In their studies, the students need to know how to author multimedia with an authoring tool. It is at this authoring stage that the application becomes multimedia as the user can add the different media types.

Authoring is integrating the different digital media elements such as text, graphics, sound, animation and video, into a coherent interactive application to convey a message or information (Neo and Neo, 1997). Authoring tools are software packages that allow the user or author to perform the authoring process. Today, there are web-based authoring tools, which allow users to create interactive and media-rich documents known as web pages that can be placed on the Internet. The Internet is now a popular educational and informational medium for this Net generation. (Tapscott, 1998)

THE COURSE: WEB AUTHORING TOOLS

The course here is an Internet application course in which students are taught to use specific web authoring tools, in this case, Macromedia Flash and Dreamweaver and then to make use of these tools to solve a problem related to the Web. Macromedia Flash is a very popular tool to create web animation. With

Flash, web-sites that just contain text and graphics can be transformed into more dynamic and multimedia-capable web-sites (Franklin and Patton, 2000). Macromedia Dreamweaver is also an industry standard for creating web pages. It has a user-friendly interface and the user need not be an HTML expert to create exciting and dynamic web pages. (Crowder and Crowder, 2000).

WEB-BASED PROJECT

The driving problem that the students need to address was to re-design a badly designed web-site on the Internet. Since most web-sites are becoming more multimedia-oriented, the students had to incorporate more than text and graphics into their web-sites to enhance them. This problem-solving project requires interdisciplinary skills involving multimedia technology and Internet design knowledge. In this project, the lecturer provided lectures on the understanding of the Internet and multimedia technology and on the basic skills in using the software as well as web-design. When implementing the project, the lecturer acted as a facilitator to guide the students.

The students were divided into groups of five by the lecturer and had to collaborate with one another to complete this task. Through collaboration, they will help motivate one another and work as team players to share ideas through inquiry and dialogue as well as to improve their thinking and social skills. Each group also had to create a report that list down the reasons for choosing a particular site as well as to design solutions or suggest improvements that they thought would greatly enhance the site without changing the content of the site. Then the group had to delegate the different areas of the project to each member according to what they saw as component tasks and to implement their suggestions. To complete the project, they had to use the prior knowledge that was taught to them about multimedia and Internet technology, design principles as well as the authoring techniques that were shown to them during their tutorials.

During the course of the project, students were allowed and even encouraged to go to the lecturer to ask for pointers on how to go about doing their project. They could either make an appointment personally or as a group to see the lecturer or they could use the Internet to chat with the lecturer, using instant messaging tools such as Yahoo Messenger. Each student had a unique Yahoo ID including the lecturer to allow for direct communications with the lecturer. Students also used the instant messaging tool to discuss the project among their group members. After completing the project, each group was required to give a brief presentation on their project to the entire class and to answer questions posed to them by the lecturer or the students themselves.

The project was assessed based mainly on such criterias as the students' ability to identify the shortcomings of the web-site, their suggested improvements, their ability to work collaboratively and the creative and innovative uses of Dreamweaver and Flash.

ONLINE SURVEY: STUDENTS' RESPONSES AND PERCEPTIONS

Ten questions were posed to the students in an online interview survey using the chat-room on the Internet. In general, the questions were well responded. The students were very enthusiastic about the project and found it very challenging working in a group environment in which they have to learn to share ideas and work collaboratively on a strategy, and cooperate with each other to successfully complete the project. .

On the whole, however, they felt they had learned a lot from the project as it was very much related to their real life experience and were able to understand the problem, work collaboratively, construct their own solutions to the problem, and determine their own learning outcomes. Some students believed that this kind of project will train them to think critically, improve their problem solving skills and help them in their future careers.

CONCLUSION

This Web-based project was chosen because it allows the students to perform critical thinking by defining the problems of the site and to come up with creative solutions to enhance the site on their own. Also, since the problem is an authentic and Internet-related problem, the students are highly motivated and able to draw from real-life experiences to complete the task. This project is a self-directed learning experience in which the students participated actively in their own learning process and determine their own learning outcomes rather than being passive receivers of knowledge or information imparted to them by the teachers. In the process, they learned to apply what they have learned previously to the project in a cooperative and collaborative manner, foster their critical thinking and problem-solving skill, an experience that enriches and enhances their learning process.

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PROMOTING mLEARNING BY THE UniWap PROJECT WITHIN HIGHER EDUCATION

Janne Sariola*, James P. Sampson**, Raimo Vuorinen*** and Heikki Kynäslahti*

Finnish universities are on the edge of transforming towards a symbiosis of traditional university and virtual university. The University of Helsinki established the Educational Centre for ICT in the beginning of 2000 to support university teachers in their attempts to benefit from technology in their teaching and to develop their pedagogy to use information and communication technologies for didactic purposes. One of the research and development projects that have been set up by the centre is the UniWap project. The aim of the project is to develop educational use of mobile technology and to find out pedagogical applications that are beneficial to students and faculty in the virtual university. The project deals with the WAP technology to be tested, piloted and completed in order to facilitate teaching and learning in the university. The project is a joint venture of the Helsinki University and *ICL Invia*. The mCastor technology enables the user, who may have several terminals like WAP, PC or Communicator, to use the same information service or system adapted to the actual user environment.

THE mLEARNING CONCEPT

The term 'mLearning' has lately emerged to be associated with the use of mobile technology in education. It seems, however, that it is used in commercial purposes rather than as an educational concept. We wonder if the term is a commercial trick to market technology and educational services or if it is an emerging concept that educators should take seriously. 'Just what is mobile elearning (mLearning)?', asks Clark Quinn (2000) in 'Line Zine'. His answer is: 'It's elearning through mobile computational devices: Palms, Windows CE machines, even your digital cell phone.'. Accordingly, mLearning is defined with the terms of ICT. When we try to understand mLearning from the perspective of educational theory, technology-based definition is obviously not sufficient. However, it is interesting to try to benefit from the technological perspective. What kind of words we can associate with mobile technology? First, 'portable', which means that we can carry those devices that we call mobile. Second, wireless, i.e. there are not wires in the equipment. These two aspects: 1) some device is so light that you carry it, and 2) there are not wires in the device, are not from educational point of view very interesting. In stead, we could try to find out something educationally interesting in the third aspect: 3) we are moving when using technology. In other words, the very 'mobility'. When we further consider the mobility aspect we can ask: 'Who is moving and why are they moving'? From 'why' we later get the question 'where'. Let us think about 'why', first. There are two explanations. First, the reason of moving is irrelevant regarding to learning and teaching. A person just happens to be moving while conducting educational activities. It deals with convenience: rational time management and other such things. In this sense, mobility does not look like interesting from the pedagogical point of view. However, it gains some pedagogical relevance when we add to the explanation that a person, a student or a teacher, is moving because it is possible for him or her to be moving and simultaneously conduct educational activities like studying and teaching. We come to this aspect later in this article. Second, we can assume that a person is on the move in some particular place or places which is/are relevant regarding to subject that is being taught or that is under the study. We may call this the perspective of expediency. We can also argue that the first of these two explanations is the perspective of receiver while the second is that of producer.

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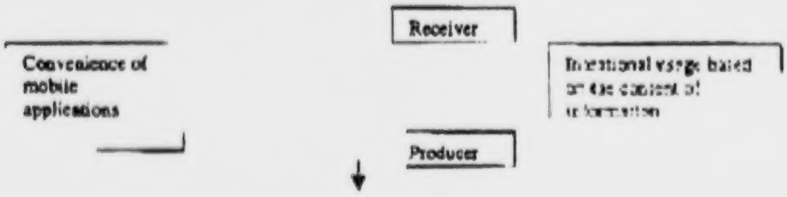
Receiver
Convenience of mobile applications
Intentional usage based on the content of information
Producer

igure 1. The perspective of convenience, expediency, receiver and producer

We can also ask, who is moving? There are several possibilities. First, naturally, a student and a teacher come to our mind. Further, it may be an outside expert or, interestingly, it may also be someone or something that is the object of studying and teaching (for example, some animal in the studies of zoology). One or two of these possible parties may be moving or, perhaps, they all are in the move. At least for the student and the teacher both convenience perspective and the expediency perspective are true. Finally, we can pose the question: 'where are they moving'? Regarding to the convenience perspective, 'where' is not important. However, we can consider this perspective from the point of view of higher education concerning the relationship between university and the surrounding society. The walls of the university become permeable. Work – leisure, university – home (or, regarding to mobility, way to work/way to home) and the public – the private, blend. We may call this relationship as a convenience relationship between university and its surroundings where people carry out their activities. When regarded from the expediency perspective, the relationship between university and the entire society can be described with expressions like 'the university as a part of the society' and 'the surrounding society as a part of the university'.

THE FIRST STAGE OF THE PROJECT

At the first stage of the UniWap project, in the academic year 2000-2001, a group of university teachers were selected as a pilot mobile group to complete their in-service training. The course focuses on educational use of ICT and it is provided by the Educational Centre for ICT. The students (i.e. university teachers) conduct their studies in teams of 2 to 4 persons and the aim is to design and to realise a subtask which is related to their own teaching. Their efforts are supported by a mentor. The first group of 14 persons was established in February 2001. Nine students were provided with Nokia Communicators 9110i and the rest with Nokia 6210 WAP mobile phones. The training includes face-to-face meetings, WebCT environment and mobile studying. In addition, the pilot group has its own web pages which are mostly used for informational purposes. These different elements associate with particular forms of network-based studying, each of them supporting in their own way the subtasks that the students are working with.

According to the mentor, the benefits of mobility at this first stage have appeared as a special possibility to support the students. Between the face-to-face meetings the mentor has given instructions through technology according to the actual situation of students' subtasks. For students the mobile technology has enabled immediate writing of short messages in order to process their learning experiences to be added in their studying portfolio. These activities have been possible even if both the mentor and the students often move between different places, including different campuses, during their work days.

CONTEXTS FOR THE MOBILE APPLICATIONS

According to the current Finnish national strategy for education, training and research in the information society, the networking society, and the economy introduce new ways of organizing education and transmitting cultural values. The production of new teaching material and the

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opening of new distribution channels require considerable structural and legislative reforms, the training of actors, and cooperation between the public and private sectors. The system of higher education degrees will be developed to correspond to the needs of working life and the principle of lifelong learning and lifelong guidance. This promotes also new contexts for mobile technical applications.

The students can be described as active consumers of learning opportunities. The universities are producing learning environments. There are also learners in the labor market. Thus, the contexts for mobile technical applications can be found in many settings between the universities and the labor market (Figure 2.).

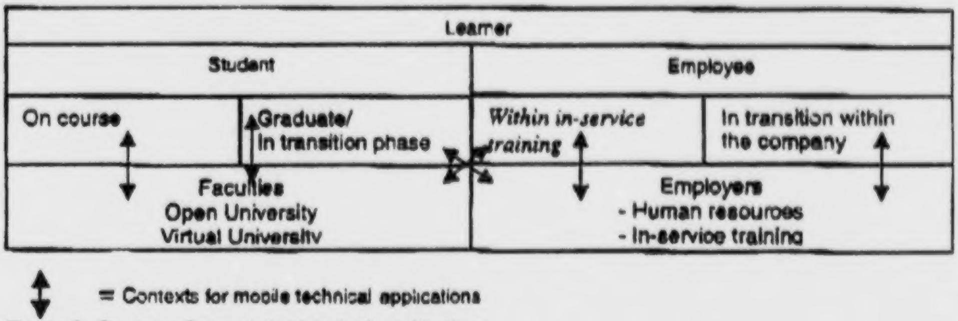

Figure 2. Contexts for mobile technical applications

The contexts for pilot projects in university settings can be found in various situations in which information is needed for urgent decision-making or the mobility promotes high-level convenience for the user. Also, enterprises can utilize same type applications when the employees want to achieve new qualifications or new tasks within the company. The information can be related to in-service training courses at the universities or new career opportunities within the company.

CONCLUSION

The University of Helsinki began to experiment with educational use of mobile technology even as early as 1997 in the form of school network projects (Nummi et al., 1998). Today these first steps appear as a reaction to weak signals of something that in the present educational world could be called mLearning. In this article we discussed mLearning as an educational concept. Further, we have reported a current project, the UniWap, in which mobile technology is utilized and experimented with regarding to the needs of students and faculty in higher education. We also introduced some possible application contexts concerning settings between university and labour market. The UniWap project is in its first, promising stage. The practice as well as theoretical elaboration provide a challenging field for both technologists and educationalists to develop mLearning.

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WEBFORMS TO ENHANCE STUDENT LEARNING ACROSS THE CURRICULUM

Anne J. Cox* and William F. Junkin III**

The uses of technology in education are as varied as instructional styles but increased student involvement benefits almost every style. Therefore, we have provided platform-independent web-based software that is freely available to enhance student learning by increasing student engagement in the classroom. This paper will briefly discuss potential uses of this resource, student-learning gains, and methods of cross-disciplinary adoption of these techniques.

TECHNOLOGICALLY BASED PEDAGOGICAL STRATEGIES

The pedagogical strategies that we employ are based on computer-based polling of student responses to instructor posed questions either 1) prior to class, using "WarmUps" or 2) during class using "BeyondQuestion." Both polling methods require that the student respond to questions in a web-based form much like forms used on Internet search engines. Similarly, the instructor writes the questions which students answer using password protected web-forms and then receives student responses in real-time via a web-page. All of the software was authored by one of us (WFJ) and is freely available from the authors for use at other educational institutions.

Computer polling prior to class, WarmUps, were first developed in the physics education research community as part of "Just-in Time Teaching" (Novak, Patterson, Garvin, & Christian, 1999). In that context, the initial use of the forms was to pose three questions prior to class based on the reading assignment for that day's class assignment. This meant that students had to answer questions about material that had not yet been covered in course lectures. The instructor then used the student responses to tailor the class to address student questions, mistakes, and understandings and thereby teach "Just-in Time." Clearly, this can be used outside the physics classroom. We developed a template to allow faculty to use this technique in their respective disciplines in ways that fit their subject matter and teaching style, even if they had no knowledge of authoring web forms.

In classrooms with key-pad systems (from Better Education, Inc., http://www.bedu.com or eInstruction, http://www.eInstruction.com) or computers available for each student, real-time polling of student understanding of material during class using multiple choice questions has also been used successfully in the physics education research community (Mazur, 1997). In this context, after covering a topic and providing a brief example, an instructor posed a conceptual question to "test" student understanding. All students, not just the same ones who answer questions in class every day, had to respond using a computer or a keypad system. The instructor received a histogram of student responses to the answers

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** Erskine College, Due West, SC. wjunkin@erskine.edu in real-time on a main computer and could adjust the lecture appropriately to address student confusion or move on to the next topic. The instructor often also had students discuss answers with each other to increase peer instruction and active engagement in the classroom. Again, we wanted this to be available to non-physics faculty and developed the program "BeyondQuestion" to address this need.

CROSS-CAMPUS ADOPTION

The templates that we have available do not require much technological savvy. In order to enhance cross-campus adoption of these simple techniques to enhance student learning we applied for and received a multi-institution AT&T Teaching and Learning Network grant (Erskine, Eckerd, Converse, and King Colleges) to provide minimal faculty development funds (~$600/faculty member for up to 10 faculty/institution) to encourage faculty implementation of these techniques in the classroom. Faculty attended a one-day workshop to give them the technological training needed to use these techniques. Following this, faculty committed at least 35 hours over the course of the semester to develop their own questions and methods for use in their course or courses. Faculty participants were not simply science faculty, but were from a variety of disciplines (modern languages, humanities, social sciences, and the arts).

After a semester of use of these techniques, a survey of faculty supported by the grant found that they primarily used WarmUps and almost all found it to be a positive experience. Faculty reported a student response rate of 90% over the course of the semester. Furthermore, of the 20 respondents to our survey (of 30 faculty participants in the grant so far), all except one reported that they plan to use WarmUps again in a future course (or are using them now) because of the positive impact WarmUps have had in their class. On the negative side, the faculty reported that using WarmUps required more time on their part to compose, read, and grade student responses on a daily or weekly basis, but overall felt it was time well spent.

Similarly, the smaller number of faculty with the technology available to use an in-class polling system ("BeyondQuestion") report high levels of student engagement in the classroom and high satisfaction with the technique and plan to continue using it in future classes.

Student attitudes and responses to both techniques have also been generally positive. For WarmUp use at the institutions involved, on a scale of 1=positive to 5=negative, faculty estimated student response to the WarmUps to be 2.3. Faculty responses reflect student answers to a similar question in two physics classes taught by one of the authors (AJC). When asked that if they had the choice between a class with WarmUps or one without (for the same class, instructor, etc.) 75% of the student respondents said they would pick one with WarmUps despite the extra work required. Furthermore, end of the course evaluations showed similar positive student attitudes about both BeyondQuestion and the use of WarmUps in class.

STUDENT LEARNING GAINS

Specific student learning gains using in-class polling ("Beyond Question") in physics lectures is well-documented (Mazur, 1997, pp.15-17) and we expect that it would extend to other disciplines as well. We also found that by asking students to respond via computer to laboratory questions and then discuss answers with other laboratory groups who had different answers almost doubled the learning gains, as measured by a multiple choice pre-test and post-test for a given laboratory exercise (Cox & Junkin, 2000).

Pre-class questions also seem to increase student learning. In our survey, over 90% of the faculty respondents indicated that student learning was positively impacted by the use of WarmUps in their classes. The student respondents agreed: all said that WarmUps were either very helpful (69%) or somewhat helpful (31%) in their learning for the course. The primary reasons cited by both instructors and students were that the WarmUps forced students to read the text prior to class and keep up with the course materials. Certainly students who read the course texts and answer a meaningful question about the text will learn more as will students who stay current with the course materials. In both cases, the classroom time will be more useful for the students. Reading student answers before class allows the instructor to make class time more relevant.

CONCLUSION

In conclusion, we have found that faculty in a variety of disciplines are willing and eager to use technology that has a proven record of enhancing student learning, has a user-friendly interface, and is platform-independent. Using the templates we've developed, we have found that "BeyondQuestion" and "WarmUps" fit that bill and enable faculty to make effective and efficient use of readily available technology with a positive impact on the learning environment in their classrooms.

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ACCESS TO TECHNOLOGY AT WOODBURY UNIVERSITY—THE AFTERMATH

Dr. Robert A. Schultz

In the fall of 1997, Woodbury University inaugurated its Access to Technology (ATT) program. The goal of this program was to put notebook computers in the hands of each of our undergraduate students. We began with the freshman class and added another class for three years, through the fall of 1999. In the spring of 1999, faced with mounting and insurmountable difficulties, we terminated the program. We now instead have a computer hardware and software requirement for our undergraduates.

In my presentation I outline what happened to our notebook program and what lessons are to be learned from our mistakes. It is my belief that our goals were sound, but that there are serious pitfalls which through inexperience we were unable to avoid. My discussion could be of help to other institutions considering delivering computer capacity to their students by means of notebook computers.

HISTORY OF THE ATT PROGRAM

Woodbury has had a computer literacy requirement for all undergraduates and graduate students since 1988. Our requirement is competence in basic applications on a PC platform.

The idea for the notebook computer program surfaced as a response to an invitation to submit a grant proposal. The grant proposal failed, but the program took on a life of its own, initially justified as a marketing tool to attract new students. In the fall of 1997, all 120 incoming fulltime first-year students received Compaq Presario notebooks with Office 97, together with a full Internet account and three hours of training. About 20 hours per week of dedicated in house tech support was provided, plus dedicated phone and email help lines. The intention was to add a class each year, until by 2000 all undergraduates would have notebooks.

In Spring of the first year, 1998, survey data revealed that incoming students did not have much computer literacy. Around 20% were able to pass the computer literacy exam. We changed the goal of the notebook program to *computer fluency,* the ability to use information technology easily and wherever its use is appropriate. In addition, it was hoped that with students having notebooks the capacity of the computer labs would not need to be increased, or at least increased as rapidly.

An assessment one year later made a number of problems clear:

- There was not enough instructional involvement in the program.

- Our initial ISP choice had unreliable service. In 1998, we moved to Earthlink, a reliable major provider with excellent phone support, and ISP student use roughly tripled.
- Three hours was just not enough training. In Fall 1998, we added a 12-hour 7-week course for all first-year notebook-using students in addition to computer literacy.

In the fall of 1998, we made some other changes: We decided to give our second-year students new computers and use the old computers as "training" computers for our first-year students. This was to help ameliorate obsolescence. We also switched vendors from Compaq to Dell mainly to improve service on the computers.

For faculty to obtain the necessary skills to teach with computers, we offered several optional workshops. Unfortunately, we were unable to mandate faculty training. With only a small number of faculty trained in the use of appropriate technology, we could not implement computing-across-the-curriculum or integrate computer skills into many courses.

COST FACTORS

Woodbury has an annual operating budget of about $17,000,000; we have a modest endowment of $7,000,000, so we are basically tuition-driven. Our (full time) tuition is $15,800-16,640. Our total number students is about 1200, with about 850 day undergraduates. In recent years enrollment has been growing about 10 percent per year.

The notebook computers were to be paid for through an extra technology fee, $850 per semester in 1997-8 and $950 per semester in 1998-9. In practice there was also some operating budget subsidy, probably on the order of $100,000. Two years' experience and numerous time-consuming appeals convinced us to switch to bundling the cost into tuition. The program was cancelled before we could implement this approach in Fall 2000.

Initially the notebooks were financed through a 5-year conventional lease. We switched to three-year operating leases with fair market value buyout because computers tend to depreciate very quickly. The intention was for students to use the lease buyout to purchase their notebooks for a reasonable price when they graduate. As it turned out, the buyouts when the program was terminated were unreasonably high. We ended up once again subsidizing the sale to the students of their notebooks for the amount of their accumulated paid-in technology fees.

FACTORS IN ENDING THE PROGRAM

Finance. It was initially hoped that the technology fee would enable us to break even. In reality, losses kept increasing for a number of reasons.

Inadequate Staffing. We seriously underestimated the increased staffing required for adequate support. There was not enough technological sophistication at the upper level of management to grasp what it would take to make the program viable.

Inadequate infrastructure and liaison to instructional uses . The final blow for me, after developing the 1-unit course for entering students, arranging class instructors and times, was the failure of the person in charge of new student orientation, to notify students that they should register for the course. As a result, about 20 out of 40 notebook computers newly acquired for the Spring of 1999 were never used. The University's infrastructure simply could not support the logistics of the program, and the goal of supplying each student with a computer was simply not going to happen.

Obsolescence. The well-intentioned decision to recycle the first Compaq notebooks that we bought to incoming first-year students and to give second year students current models itself was an enormous resource drain. It was basically not successful because the older Compaq 133s were perceived as not being powerful enough to run current software.

Platform variety. About 20% of our students work in design disciplines for which Macs are standard. Given the difficulty we were having with logistics with essentially one model, we could not see our way clear to implementing an entirely separate support structure.

HOW YOU SHOULD DO IT

The idea of supplying notebook computers to all students still seems to me a good one. There are benefits which cannot be easily achieved any other way. From the point of view of the student, our goal of computer fluency is still a sound one. From the point of view of the University, notebooks give students 24/7 access to computing power without having to maintain a large computer lab capacity.

In retrospect, two things that we did were very wrong:

First, this program was imposed on a University otherwise not ready to utilize it. I had hoped to be able to use the program to bootstrap the University to a higher level of technology utilization, but this did not come about. A preexisting infrastructure including IT-knowledgeable faculty and staff is required. Infrastructure must be in place **BEFORE** you begin having students acquire computers. If funds are not available to bring faculty and staff up to speed, I would strongly recommend against doing this particular project.

Second, we assumed the burden of becoming computer dealers for the students. Without the support infrastructure, we ended up not doing this very well. Distribution logistics were our Achilles' heel.

EVALUATING THE BEACON LEARNING CENTER

Kenneth L. Shaw*
Cathie Pomar*
Lindsay Gotshall*

The Beacon Learning Center (BLC) began operation in 1998 with resources coming from the Bay District Schools Office and resources from the Florida State Department of Education. Though the resources they had in 1998 and 1999 were sizably less than what they have now, an infrastructure, political positioning and valuing within the District Schools Office evolved in these formative years. In July 2000, the BLC received a five-year $10,000,000 Technology Innovation Challenge Grant (TICG) from the United States Department of Education to further its goals. When they were awarded the TICG in 2000, the staff of the BLC utilized their existent infrastructure and drew on the reputation it already had established to make sizeable progress during year one.

PROJECT GOAL 1: DEVELOP LESSON PLANS AND UNITS

The first objective during year one was to have 700 lesson plans online for mathematics, language arts, social studies, and science in grades K-12. As of April 9, 2001 there are 1066 lesson plans in the subjects named above as well as in physical education and music. What we found is that these lesson plans go through a rigorous validation process and each lesson plan is aligned with Florida's Sunshine State Standards (SSS). The validation process ensures that each lesson: integrates Florida's SSS, explains how to assess achievement toward selected standards and when available includes an easy-to-use rubric that clearly delineates expectations of performance levels providing clear goals for teachers and students. Florida's SSS are very comprehensive in that each subject is partitioned into strands. Each strand has a variety of standards. Each standard is broken down to learner levels (e.g., K-2, 3-5) and each level has specific benchmarks. Ensuring that each lesson targets a specific SSS is very attractive for teachers as is the BLC website's facility for searching lesson plans by standards.

Lesson plans have been developed by teachers in the classroom or by teachers that work full-time for the BLC. Subsequently the lessons vary across subjects, grade levels, standards, and benchmarks. A more concerted effort is now occurring to develop units, a composite of two weeks instruction centered around a theme or topic. The project had set the goal of 25 units to be developed by the BLC staff before the end of year one. At present there have been 12 units posted. Developing interrelated lessons, web lessons, and appropriate assessments is complex, and the BLC is not only internally validating these, but is piloting these units in the classroom and obtaining comprehensive reviews from teachers to ensure the worth of the units. The BLC now realizes their expectation in terms of numbers was higher than what they could actually create in terms of the product's quality.

PROJECT GOAL 2: PROVIDE STAFF DEVELOPMENT

The objective this year was to provide staff development to 120 teachers.

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This training focused on curriculum development utilizing a curriculum, assessment, and instruction design. Thirty of the 120 would receive training as validators and 15 would receive training as web lesson developers. At least 150 teachers have been trained with 100 as validators and 21 teachers as web lesson developers.

Our assessment of staff development is that it is a vital part of the growth of the Beacon Learning Center. The two vital foci throughout the next four years is increasing the numbers of lesson plans and unit plans on the web and doing this in a quality way. With only a few (8) curriculum developers and validators on staff at the BLC, continuing to meet the targeted goals of lesson plans and units in years 2-5 will be hard to accomplish without a steady stream of new developers and validators. This we believe to be a critical link in ensuring the steady progress of the grant. More effort should focus on finding and keeping good quality teachers to assist in this project.

PROJECT GOAL 3: PROVIDE ONLINE STAFF DEVELOPMENT RESOURCES

The main objective under this goal is to develop at least 15 online staff modules. To date there is one module on the use of the Beacon website that is currently in a piloting phase through a University of Central Florida distance-learning course, and 14 modules in some phase of development. There is one complete and two under development for developing quality assessments and there are four technology integration modules under development including: Website review, software evaluation, Tips for Integrating Technology, and a SiteMaker tutorial. Modules under revision include: a Florida Accomplished Practices interactive module, a module of Connections (a Florida Department of Education/Pasco County Initiative on curricular alignment and standards-based planning) and three modules for ESOL strategies. Broward County has contributed Thinking Skills and Learning Strategies modules for at-risk students.

These modules are planned to be interactive resources that teachers can utilize to improve their teaching. During year two, we will evaluate the use of the modules and their effectiveness.

OTHER FINDINGS

In working closely with the staff of the BLC, we observed incongruities between staff members and the administration. For example, we were told by curriculum developers that their perceptions were that administrators expected them to work quietly at their computers and not be engaged in collaboration with their colleagues. The administrators stated that collaboration was a key element in producing quality curriculum products. Differences such as these caused us to utilize The Readiness for Organizational Learning and Evaluation Instrument (ROLE) constructed by Preskill and Torres (2000) to determine the overall climate of the BLC. The instrument allowed us to determine administrators and staff's perceptions and beliefs in six areas: culture, leadership, systems and structure, communication, teams, and evaluation. Due to space considerations, we briefly focus on the two areas of Leadership and Systems & Structures. Survey results indicated a sharp difference between the administrators and the curriculum developers in Leadership (4.83, 2.98) and Systems & Structures (4.11

& 3.01). For example, in leadership, administrators strongly agreed that they took on the role of facilitating employees learning while curriculum developers tended to disagree. In Systems & Structures, all administrators strongly agreed that workspaces were designed to allow for easy and frequent communication with each other. Curriculum developers tended to disagree with this statement.

After results were shared with the BLC director, it was decided to have an all-day retreat to discuss the results of the survey. The survey data were combined and shared with the administration and all staff members. Preliminary remarks were made by the director that established a tenor of openness and candidness. The administrators and staff were partitioned into 3 groups and discussion was facilitated by the coauthors of this paper. Results of the meeting were very positive as administrators better understood the needs of the staff and the staff better understood the needs of the leadership. For example, curriculum developers now have a sense of empowerment, realizing that communication is valued in producing the quality lesson plans. Administrators also realized they are seen as ones that "tell" information to the group. Changes have taken place to allow more interaction between staff and administrators.

We have learned that for an organization to maximize its effectiveness, communication is key. We affirm the administration's position of the importance of conducting the survey and of the ensuing discussion that took place. Although there are risks for doing this, the outcome of the meeting initially seems to be very beneficial to the climate of the project.

One other major finding is that the products of the BLC have received rave reviews and the dissemination of the project, which was to be a major objective in year 5, is exploding at an alarming rate. Most counties in Florida know of the BLC products. Many are now seeking additional information of using the material and having their teachers submit lessons. The administrators have gone to leaders in the legislature seeking additional funds to hire staff developers in different regions of the state to train curriculum developers and validators. Interest from other states is beginning to increase. The administration is now having to deal with these external issues and this has caused the staff to not have the administration attention it once had. To meet the demand, it is imperative that the BLC increase staff and administration to meet the growing need.

CONCLUSIONS

From our evaluation, we have learned that having an infrastructure in place, that is qualified people who are already organized, is of great value when a grant is awarded. The school district's support was based on a foundation of the work that had already taken place so they could genuinely support the proposal and easily make the transition of finding adequate space and adding personnel to ensure the project's success. Overall, the project is progressing well. The quality of the lesson plans, with the rigorous validation are the BLC's greatest strength. Continuing challenges for the BLC are growth, funding, and infrastructure.

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Cover Sheet

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NASA TECHNOLOGY AND TOOLS THAT SUPPORT TEACHING

Stephanie L. Smith

NASA sponsors a variety of on-line programs and activities that are learning environments for science and technology education. These classroom technologies are part of NASA's commitment to involve the education community in its scientific endeavors and inspire America's students
toward academic excellence. A NASA program called the Learning Technologies Project (LTP) hosts over 50 online projects that deliver education materials to students around the globe. The LTP combines NASA research, the perspective of NASA employees and advanced Internet technologies to provide unique technology-based learning environments.
Technologies such as streaming media, interactive gaming, 3-D simulations and remote manipulation of scientific instruments are woven into curricular studies to promote academic achievement in K-12 math and science. This paper highlights some of the notable projects within the LTP program; the ROVer Ranch, NASA Qwhiz, Quest, the Learning Technologies Channel, FoilSim, Telescopes in Education and the WHY? Files.

The ROVer Ranch is an interactive, Web-based robotics workshop for assembling the hardware and instructions for a simulated robot to perform a mission in a virtual 3-D environment. An example mission environment is the photoreconnaissance of the International Space Station (ISS). The ROVer Ranch presents the learner with fundamental information about the mission goals, facts about the orbital environment and robotics. Based on this information, the user builds and programs a virtual robot to accomplish its task. Users design the robot by selecting parts for various functions such as propulsion, electric power, navigation and inspection. Once the robot is built, it's programmed and placed in a 3-D virtual environment. Options available in the simulation depend on the planning and design of the robot. The idea is to involve users in a simplified design and programming task that exercises skills in mathematics and science as tools that can be explored interactively. ROVer Ranch gives participants an opportunity to learn and apply basic math and science concepts and to observe the behavior of a system they design. The ISS mission and prototype robot are based on the Sprint AERCam, a small spherical free-flying camera platform used for outside inspection of spacecraft which has been put in an ISS VRML model. The ROVer Ranch emphasizes the concepts related to robotics and the environment of the mission. http://prime.jsc.nasa.gov/ROV

The NASA Qwhiz! is a multi-player Web game that students can use to study class materials, learn technology skills and create learning games for others. Students match wits with other students around the country in real-time competition or play the computer on a single player question/answer game board. Teachers use the Qwhiz for study drills, to evaluate student learning and fulfill instructional technology teaching requirements. The website contains the Qwhiz game library, the QwhizMaker and the QwhizMiner. A Qwhiz consists of columns of question categories and the object of the game is to answer as many questions correctly in the shortest amount of time. Game sessions can get pretty lively! The QwhizMaker is a set of Web forms used to make game boards and the QwhizMiner is a search tool to retrieve Internet data to put into a Qwhiz game. http://prime.jsc.nasa.gov/Qwhiz

NASA Quest is an Internet project that combines the experts of NASA and
Internet-based communication tools to highlight scientist's technical work as they go about performing NASA's mission. At present there are five subject teams; Space Team Online, Aerospace Team, Solar System, Deep Space and Women of NASA. Each team has a set of NASA volunteers that contribute biographies and journal entries over the course of the project. Activities include webcasts, chats and question/answer sessions with NASA experts, audio and video programs, lesson plans, collaborative activities for students, background information, photos and a place for teachers to meet and collaborate online. These projects are open to anyone, free of charge and participants can come and go as they like. http://quest.arc.nasa.gov

The Learning Technologies Channel (LTC) is a branch of the Quest site that provides chats, forums and webcasts to the educational community. A QuestChat is an opportunity for students and the general public to meet and ask questions of NASA experts using the Internet. From a desktop computer, people can type comments and questions into a "chat room" and receive live responses from NASA personnel. The QuestChats are run on the Quest website so all a user needs to participate is a graphical web browser and an Internet connection. A forum is an opportunity to interact with NASA experts at more flexible and convenient times. LTC video webcasts feature special events such as shuttle launches and landings, planetary probe activities or other important NASA events. The video webcasts also feature specially scheduled education events such as NASA Connect, the Stanford Solar Series, and US. Department of Education Meetings. The LTC webcasts feature concurrent moderated Chat Rooms for interaction with scientists participating in the programs. LTC events are delivered to the Web via streaming media using Real Media technology which is freely available. http://quest.arc.nasa.gov/ltc

FoilSim is interactive simulation software that demonstrates the airflow around various shapes of airfoils. The Airfoil View Panel is a simulated view of a wing being tested in a wind tunnel with air moving past it from left to right. Students change the position and shape of the wing by moving slider controls
that vary the parameters of airspeed, altitude, angle of attack, thickness and curvature of the airfoil, and size of the wing area. The software displays plots of pressure or airspeed above and below the airfoil surface. A probe monitors air conditions (speed and pressure) at a particular point on or close to the surface of the airfoil. The software calculates the lift of the airfoils, allowing students to learn the factors that influence lift. http://www.grc.nasa.gov/WWW/K-12/FoilSim/index.html

Telescopes in Education (TIE) provides the opportunity to use a remotely controlled telescope and charge-coupled device (CCD) camera in a
real-time, hands-on, interactive environment to students around the world.
TIE uses a science-grade 24-inch reflecting telescope located at the Mount Wilson Observatory, high above the Los Angeles basin in the San Gabriel Mountains of Southern California. The telescope is used by K-12 students to observe galaxies, nebulae, variable stars, eclipsing binaries, and other objects. The telescope and CCD can be operated remotely by educators and students from the convenience of their classroom computers via modem and special astronomy software. Images are downloaded to a remote user in five minutes or less (depending on the user's modem) and can be stored on the user's computer for image processing and study. http://tie.jpl.nasa.gov/tie/index.html

The NASA WHY? Files is a series of instructional programs consisting of broadcast, print, and on-line elements. Emphasizing standards-based instruction, problem-based learning, and science as inquiry, the series seeks to motivate students in grades 3-5 to become critical thinkers and active problem solvers. Each program supports the national mathematics, science, and technology standards and includes a 60-minute video broadcast, a companion educator's guide, web-based activities and materials, and information about NASA programs, projects, facilities and researchers. Recent sessions have focused on sound, electricity and aerodynamics. The NASA WHY? Files is broadcast on the Learning Technologies Channel. http://whyfiles.larc.nasa.gov/

These and many other NASA education resources are available for use in schools and are for the most part free. Resources are available in the disciplines of aeronautics, aquatics, astronomy, astrophysics, career planning, environmental science, history, mathematics, science, engineering, space science, volcanology and weather mapping. All of NASA's online information such as up-to-the-minute mission information and images, archived information, lesson plans and teacher tested activities is available to create classroom content. These support materials can enhance established curriculum or create new collaborative projects. To participate in any of these projects visit the NASA Education home page, Spacelink or the Learning Technologies Project. Join us online as we share the power and excitement of the work at NASA with our children.
http://education.nasa.gov
http://www.spacelink.nasa.gov
http://learn.ivv.nasa.gov

SUPPORTING INTERNET BASED COURSES WITH MICROSOFT FRONTPAGE

Robert Workman

The Microsoft FrontPage web page editor was used to create web based course components such as course syllabus, student assignments, and tests questions. Students in the course create their own Internet webs that contain their personal course homepage, assignment solutions, and answers to test question. These course components are accessed using the WebCT learning management system.

The students WebCT homepage, shown in Figure 1, contains links to the course components. The course calendar shown in Figure 2 contains links to day by day activities. A click on a topic such as "Finish word Project 4" brings up the course outline show in Figure 3. The course outline is presented as collapsible hierarchical bulleted list. A click on one of the topics expands the topic. The picture bullets were selected from FrontPage themes. Other course components that can be accessed from the WebCT homepage are mail, grades, and quizzes.

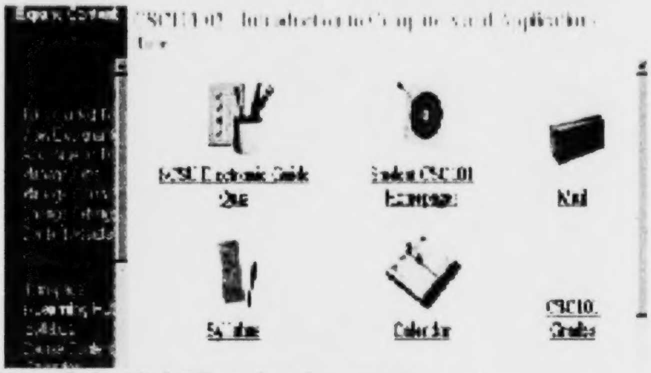
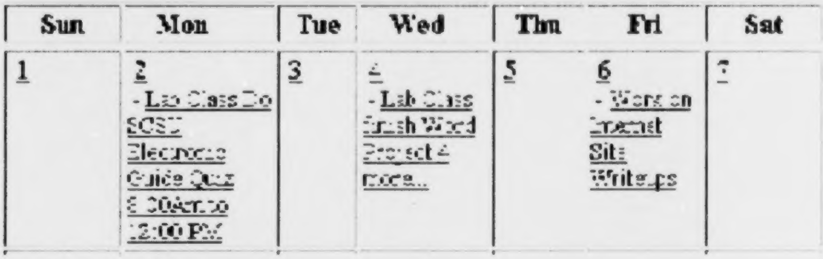


Figure 1. Part of the WebCT student homepage



Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2 - Lab Class Do SCSU Electronic Guide Quiz 8:30Am to 12:00 PM	3	4 - Lab Class Finish Word Project 4 more...	5	6 - Work on Internet Site Writeups	7

Figure 2. Part of the course calendar as displayed in WebCT

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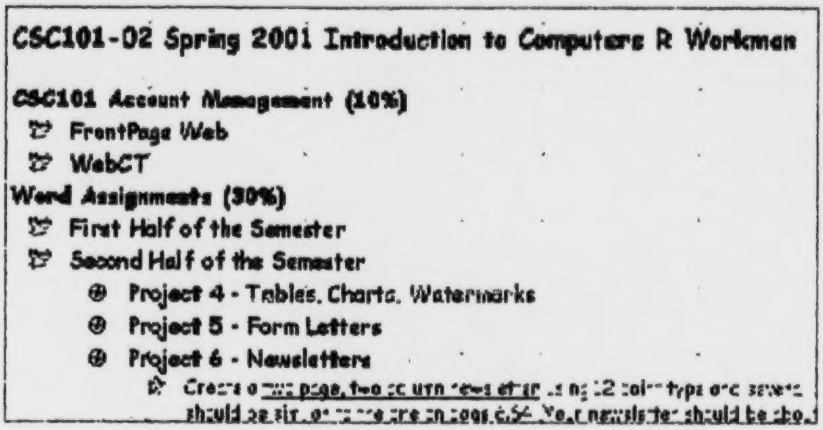


CSC101-02 Spring 2001 Introduction to Computers R Workman

CSC101 Account Management (10%)

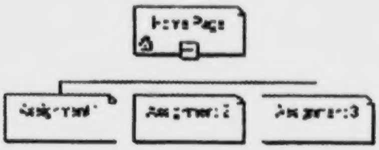
- FrontPage Web
- WebCT

Word Assignments (30%)

- First Half of the Semester
- Second Half of the Semester
  - ⊕ Project 4 - Tables, Charts, Watermarks
  - ⊕ Project 5 - Form Letters
  - ⊕ Project 6 - Newsletters

Figure 3. A collapsible list with second half, project 6 expanded.

At the beginning of the course students are given accounts on the schools server. Students are instructed in how to set up an online web using FrontPage. Students add links on their homepage to their completed assignments. Figure 4 shows a navigation view of the contents of a student web. Figure 5 shows the same homepage viewed with the Internet Explorer browser.



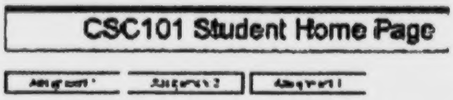


Figure 4. Navigation view of a student web. Figure 5. Student course homepage

WebCT provides a convenient and confidential way to submit grades to students. Figure 6 shows an example of the instructors view of student grades. Grades can be entered manually or objective question quizzes can be graded automatically. A formula can be written to compute midterm and final grades. Figure 7 shows such a formula.

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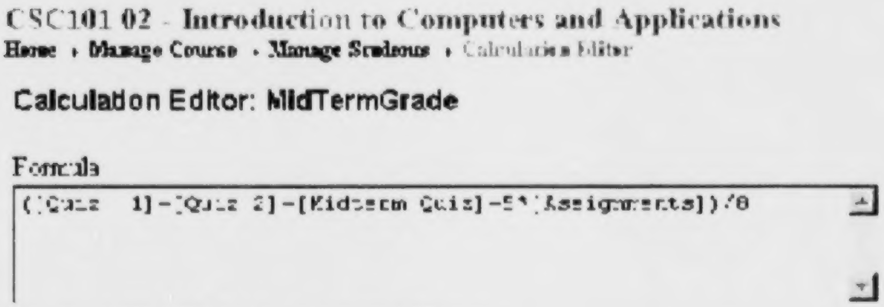

CSC101 02 - Introduction to Computers and Applications

Home › Manage Course › Manage Students › Calculation Editor

Calculation Editor: MidTermGrade

Formula

```
([Quiz  1]-[Quiz 2]-[Midterm Quiz]-5*[Assignments])/8
```

Figure 7. A WebCT grade calculation formula

Conclusion

Student access course material written with FrontPage by way of the WebCT course management system. Students create FrontPage webs that contain assignment and test solutions. Advantages to doing this include: unlimited copies available, ease of updating, available for prospective students and others interested in the course, and hyperlinks to related material. Inquires about the course are answered thoroughly with a web address. What goes on in the course is also available to colleagues, school administrators, parents, and publishers. The ease of updating course materials is useful. Hyperlinks in the syllabus to related material are used to provide access to supplementary online material. Creating course material with a web editor and organizing access to the material with a learning management system create a learning environment worth considering.

THE MATCH GAME: PUTTING SOFTWARE AND LEARNERS TOGETHER

Sara L. Hagen*

> Learning is a relatively permanent change in performance that can be shown to be the result of experience (Fitts & Posner, 1967, p. 8).

The main goal of educational technology is to assist the learner in making sense of the world in the most effective, efficient manner. Therefore, putting learners and technology together is a matter of determining the needs of the learner and matching those needs with proper technological tools. Moreover, it is important to match the software available within specific disciplines to strategically develop the skill sets required for proficiency in that domain. Research in cognitive psychology has begun to uncover the frameworks underlying particular performance requisites in various domains (Anderson, 1987). These researchers realize that "understanding and substantiating the details of how knowledge is acquired in their framework is a prerequisite to advancing their grander claims about the nature of cognition" (p. 193). Once the skill sets are understood, practice appears to play a large role in the development of expertise (Williamon & Valentine, 2000). This paper will address the implications of "deliberate practice" as it relates to choosing software for the development of specific skills within any field.

Researchers have examined salient characteristics of exceptional performances in a number of domains to provide evidence for how specialized skills are acquired. A few examples of studies in outstanding performances include the areas of chess (Chase & Simon, 1973a, 1973b), mental calculation (Staszewski, 1988), basketball (Allard, Graham & Paarsalu, 1980), and figure skating (Deakin, 1987). The conclusions drawn from these studies suggest that outstanding performances are not necessarily due to exceptional ability or to divine intervention, but to extensive training over time.

The Power Law of Practice, a cognitive psychology term, has been used to describe this phenomenon. This law states "the speed of performance of a sensorimotor task increases as a power function of the number of times the task is performed" (Williamon & Valentine, 2000, p. 354). Other researchers suggest that this law applies to purely cognitive learning situations as well (Anderson, 1982). Anderson observed that approximately 100 hours of learning and practice were required to acquire a 'reasonable degree of proficiency' (p. 369). Music researchers (Sloboda, Davidson, Howe, & Moore, 1996) found that approximately 3300 hours were necessary over a period of approximately 10 years for young musicians to become proficient enough on the piano to reach principal instrument level in a university program. Those pianists who reached expert level by age 20 estimated a total of 10,000 hours of practice by the start of their performance careers (Ericsson, Krampe, & Tesch-Römer, 1993).

There are three stages of skill acquisition proposed by Fitts and Posner in "Human Performance" (1967): the cognitive, associative, and autonomous stages. The cognitive stage involves the use of cues, demonstrations, and recall of events

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that trigger old patterns. The associative stage of learning involves the integration of practice with the new patterns to gradually eliminate errors. Practice needs to be sequenced for each skill component, scheduled appropriately with frequent repetition within short periods of time, and alternated between part and whole practice—if components must work in tandem—to successfully perform the task. The autonomous stage of learning is characterized by the need for less cognitive control and less processing of each detail. Several strategies have emerged from these studies for achieving greater autonomy, thereby lowering cognitive overload (chunking, proceduralization, compression, and induction). Please refer to Fitts and Posner (1967) for a more detailed description of these strategies.

This learning process was the basis of a recent pilot study for the current dissertation project. Sight reading, or more specifically sight playing, at the piano requires real time processing of new information. Sight playing is defined as playing a novel piece of music without prior preparation. After the piece is played once, playing it again technically becomes practice or rehearsal rather than sight playing. By studying the research base for piano sight playing, the skills needed to acquire expertise were defined and software was found that would develop these skills most efficiently, matching the age level of the subjects. Six subjects from a third year group piano class for music majors whose major instrument was other than piano participated in a case study. Six lessons were designed which were linked to specific skills using a piece of software. The realization that expertise is gained over a significant amount of time was taken into account, looking for minimal gains. Also a factor in working with software is learning style and individual differences. Therefore, subjects were given the Group Embedded Figures Test (GEFT) devised by Witkin and others to discover one's level of field dependence (global) versus field independence (articulated) on a continuum of extremes of each (Witkin, Oltman, Raskin, & Karp, 1971). Field dependent (FD) learners have a more difficult time taking apart the visual field and tend to process information in larger chunks as presented. Field independent (FI) learners are able to dissect the visual field and reconstruct the information to meet their own learning needs. It was hypothesized that using an accompanying method of improving sight playing would better suit the field independent learners, as more emphasis is placed on timed performance, requiring faster processing and the ability to structure the visual field (in this case a piano score) to match their skills. Subjects were pretested before beginning the treatment program.

One of the most important skills in sight playing is performing musically, while at the same time processing the notes on the page for the first time. Two specific skills necessary to achieve this are keeping the eyes moving forward in a continuous fashion, reading slightly ahead of the hands, and keeping a steady beat, leaving notes out if necessary. The software used to develop these skills was Finale© by Coda, a notation program designed to print sheet music. Subjects were presented with new music each session. They were to spend time mentally previewing the piece without any physical practice before playing the music. They then started the playback function on the computer and played a duet with the computer. The goal was to stay with the computer and to play as many correct notes as possible. The eye tracking device was an integral feature of the program, which kept their eyes moving forward, avoiding the typical problem of getting "stuck" at a trouble spot. After six sessions subjects were given a posttest, which was scored by two independent judges.

There was no significant difference between the pretest scores and posttest scores ($p > .05$), as was anticipated. Subjects were then divided into two groups for further comparison (FD = 3; FI = 3). Results indicated that no significant differences ($p > .05$) existed at the time of the pretest. FI subjects achieved significantly higher scores ($p < .05$) after the six sessions than did the FD subjects. This result allowed for the decision to accept the hypothesis that the treatment met the needs of FI students more effectively than for the FD subjects. While it is important to consider these results with caution, the results warrant further investigation.

Several questions should be addressed when matching software to learners for the purpose of skill acquisition. Among them are:

- At what stage of learning are the students in question?
- What skills do the learners need to develop?
- What skills will the software develop?
- What kind of learner will be best served by the presentation style of the software?

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SUPPORTING MATHEMATICS AND SCIENCE TEACHERS THROUGH TECHNOLOGY

Hakan Y. Atar*and Chris Muire*

Over the last decade, numerous national reports have called for reform in the technical subject areas of mathematics, science and technology education (e.g., National Education Goals Report, 2000). A consensus has emerged that indicates the key for change in our schools is not only integrating technology into classrooms, but also supporting teachers in their practices and professional development (e.g., Roblyer & Edwards, 2000 Newby, Stepich, Lehman, & Russell, 2000; Atar, 2001). However as the results of student performance in mathematics and science indicate (e.g., NAEP), there still appears to be enormous needs for improvement. As one example, less than half of American teachers feel "very well-prepared" to meet the challenges of rapidly increasing technological changes and greater diversity in the classroom and "although many educators and policy analysts consider educational technology a vehicle for transforming education, relatively few teachers (20%) reported feeling very well prepared to integrate educational technology into classroom instruction" (US Dept. of Ed, 1998). The purpose of this paper is to present a number of ripe opportunities for staff development in the areas of mathematics and science education.

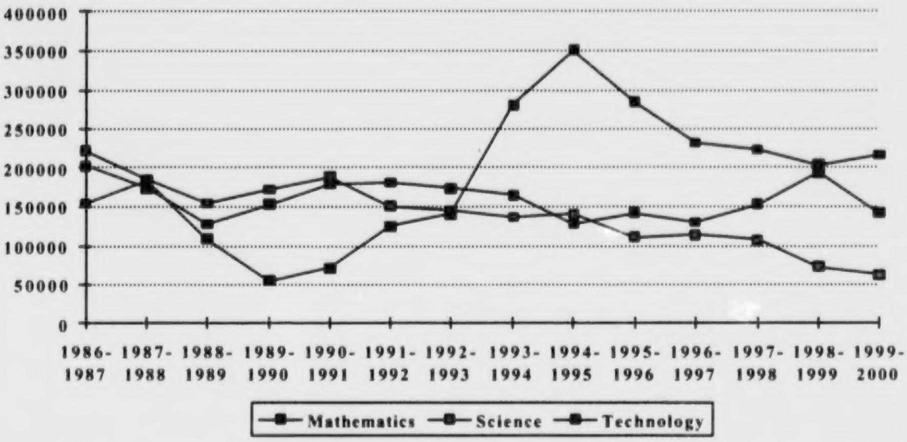
We believe that as the world moves toward a global economy, K-12 students must be prepared in mathematics and science. These subject areas are seen as gatekeepers for admission into college and ultimately obtaining productive careers. Moreover, the utilization of advanced technology is becoming an increasingly important skill for workers in the 21st Century. In our view, to increase mathematics and science literacy of students will be highly dependent on investments by teachers' in learning and using new technologies in school curricula. The positive effects of utilizing technology resources with students are well documented. (e.g., Songer, 1998; Roblyer et al., 2000; Settlage, 1995; Linn, 1998). In a collective sense, it seems that increased attention on technology may also closely influence effective ways of teaching mathematics and science. We further believe that utilizing advanced technologies to enhance classroom environments offer exciting possibilities for involving students in learning.

PROFESSIONAL DEVELOPMENT TRENDS

In the following Figure 1, we present important information obtained from public sources to illustrate the longitudinal trends of staff development in the areas of mathematics, science and computer education among K-12 teachers in Florida. The graphs were developed from two data sets that are required of the 67 school districts reporting to the Florida Department of Education (FLDOE). Essentially, we asked officials at FLDOE to crosswalk these two data sets that include: 1) The Number of Elementary, Middle and High School Teachers which is a data element compiled by Management and Information Services (MIS) in the Division of Public Schools to monitor personnel; and 2) Inservice Contact Hours that are generated by the Division of Human Resource Development to qualify inservice teachers for re-certification of their professional teaching licenses.

• *Florida State University*

Figure 1. Inservice Contact Hours in Mathematics, Science and Computer Education completed by all Elementary, Middle and High School Teachers in Florida in the Years 1986-2000.



From Figure 1, we can see that in the ten-year period between 1986-1996, there was a longitudinal decline in the number of contact hours being spent by K-12 teachers in staff development activities in mathematics. In 1996, the number of contact hours with K-12 teachers in mathematics began to rise reaching a peak in 1998 (the same level achieved in 1986). In the area of computer education, which FLDOE officials report includes the vast majority of hours in technology education, a steep decline occurred between 1986 and 1990. Then, between 1990 and 1995, inservice hours with teachers in technology showed a significant increase followed by another steep decline. Unfortunately, in the area of science, inservice contact hours with teachers have never improved since 1986-87 levels. Importantly, what is not shown in Figure 1 above, is that the number of K-12 students in Florida has dramatically increased by nearly 1 million and the number of K-12 teachers has increased by over 30,000 teachers. Thus, the corresponding ratio of contact hours per teacher has also decreased proportionally in all areas.

There are some fluctuations in the upward trends that deserve comment. That all areas begin to scale upward during the 1988-89 School Year might be directly correlated to emphasis being given to mathematics, science and technology by the Florida Legislature. After legislative mandates directed its creation in 1988, the FLDOE developed *A Comprehensive Plan for Improving Mathematics, Science and Computer Education in Florida*. This document was adopted by the Florida Board of Education and all 67 school districts in 1989. Also in 1988, the Florida Legislature strongly supported many new staff development fully funded initiatives in these subject areas. Later however in 1991, the states' student enrollment began to escalate and by 1991, the Legislature chose to end appropriations for nearly all of the programs created in 1988.

RECOMMENDATIONS

Pilot testing of the high stakes Florida Comprehensive Assessment Test (FCAT) began in 1997 with full implementation in 1998-1999. In our view, the mathematics peak seen in Figure 1 is a direct response by the Florida Education System to prepare for the FCAT mathematics sub-test. Recently, the legislature of the State of Florida decided to include science content in its student-testing program called FCAT (Florida Comprehensive Assessment Test). Pilot testing of the Science FCAT will begin in 2002 with full implementation in 2003. No doubt that with this new legislative mandate, science teachers in the State of Florida will face new pressures to revise their curricular practices consistent with the changes in FCAT. In this regard, we are hoping that teachers will be given enough time and support as they change their practices and new roles in the classroom. We believe that this support would include professional development in both science content as well as technology.

In our view, the content areas of science and mathematics are uniquely compatible discipline areas for integrating innovative technologies into school curricula. Specifically, middle schools in Florida will seek assistance for improving student performance on FCAT and virtually all schools in the state will immediately need broad-based support and professional development in science due to a longitudinal decline of inservice activities with teachers that began in 1986.

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EXAMINING STUDENTS' AND TEACHER'S PERCEPTIONS OF MICROCOMPUTER BASED LABORATORIES (MBLs) IN HIGH SCHOOL CHEMISTRY CLASSES

Hakan Yavuz Atar*

Many educators are advocates of the potentials for enhancing learning with new instructional technologies (e.g., Settlage, 1995; Edelson, 1998; White, 1998; Linn & Hsi, 2000). In this sense, adapting MBLs for use in school science curricular activities may alter the traditional ways of doing experiments by students and teachers (McRobbie & Thomas, 1998). Yet, many science educators support the use of MBLs to enhance the learning of science concepts, graphing skills and problem solving skills (e.g., Nakhleh & Krajcik, 1993; Edelson, 1998; Linn & Hsi, 2000). However, the effective implementation of microcomputer technology into the classroom has always been a great challenge for teachers. Some teachers have been excited and motivated by the integration of technology into their classroom, whereas others seem to be intimidated due to lack of technical training and personal interest.

As a result of integration of technology into schools, many in-service teachers are being asked to involve many new tools into their instruction. In addition, in a technology-enhanced classroom where teaching and learning may be dramatically changing, the needs of those most affected, the students and teachers, are critically important. Their perceptions of using MBLs are crucial for gaining a better understanding of the educational impact of MBL technology on teaching and learning. Learning more about their perceptions will be an important point of departure for investigating any proposed change. Due to the broad range of perceptions indicated by both the teacher and the students, in this paper I mostly focused on the teacher's perceptions of using MBLs in High School Chemistry classes.

SOME IMPACTS OF "NEW" VERSIONS OF MBLS ON INSTRUCTIONAL PRACTICES

Thirty-three students from two high school level AP Chemistry 2 classes and their teacher participated in this study. The students involved in this study were 11th and 12th grade students. For the purpose of this study, I selected four students as the focus group for more intense study than others. The teacher involved in this study, was a very experienced teacher. He had over 20 years of teaching experience in almost all disciplines of science.

The teacher informed me that he started using "old" versions of MBLs with the "old" models of Apple II Es back in 1996, however quit one year later because of the difficulties he confronted in manipulating them. He stated that his students got so confused with setting up those "old" versions of MBLs that they lost sight of the experiment and what they were trying to do. He indicated that old versions of MBLs did not have much of a variety of sensors that he could use in varied experiments.

The teacher was amenable to incorporating "new" versions of MBLs into his teaching again, given his knowledge of the new developments in computers

*Florida State University

and MBL technology. He thought that advancements in MBL technology would enable him to do labs that he was not able to before. He reported:

> I think the selection of probes has increased the availability of labs to do, which you could not measure before, not easily. The gas pressure probe, the colorimeter, and all those things definitely they are going to expend the possibility of measuring different parameters. It was very difficult to do before. I was trying to find conductivity type meters and they were basically usually just series of lights (Teacher interview, Fall 2000)

However, the teacher appeared to be skeptical about the possible instructional gains associated with using MBLs. Although he acknowledged the potential benefits of using MBLs, he insisted on doing some labs in traditional ways. He stated that he would not use MBLs for some labs especially when introducing new science concepts because he seemed to think that whether "old or new," MBLs were reducing student concentration on the scientific concept being taught. He believed that while the MBL was collecting the data, students would be less challenged; therefore they might get bored and detached from the activity. In order to keep the students engaged in the activity, he suggested challenging the students by modifying the labs in a way that students would be busy with other related materials while the MBL was collecting data. He reported:

> By introducing the MBL, you introduce more possibilities for problems. They [students] are having problems manipulating. MBL is collecting all the data, so what are they [students] doing? You have got to make sure you have something for them to do while it is collecting data. They are not going to sit there and watch that thing collect data. So, you have got to modify your labs so that if it [MBL] is collecting all the data. I think you need to be doing something else, you know.(Teacher interview, Fall 2000)

In order to increase the effectiveness of MBLs for lab activities, the teacher suggested finding a "healthy mix" of blending traditional methods and MBLs. He seemed to believe that, too much use of MBLs might be an overkill of technology. He thought MBLs were no good for the activities that do not involve repetitive tasks. Also, he did not seem to prefer using MBLs while introducing new concepts because he seemed to think that minor difficulties in manipulating MBLs would negatively affect student concentration on the concept being taught.

The teacher's above perception was consistent with some students' statements. One of my focus students, for example, thought that using MBLs in investigations would be more beneficial to him "if he already had a good understanding of what he was doing". Otherwise, he thought, using MBLs would not contribute to his learning. He stated, "If the students have no idea about the whole experiment, it is just like copying the numbers off the calculator." Regarding use of MBLs in science labs, he also raised his concerns that understanding or interpreting the graph did not necessarily mean understanding the connection between the graphs and the science concepts being investigated.

Moreover, from the teacher's perspective, one of the things that could be done to get the students more involved into the experiment rather than the MBL was to explain to them how the probes were working. He seemed to believe that explaining how the probes works would enhance student understanding of what it is they were doing:

> Teacher: I think you could overcome that by explaining to them how the probes are working. The next time I use those MBLs, I will use the pH probe for sure, but I think I will spend a little more time explaining how the probe works. I think another thing I will do is have them calibrate it. So, I think that would be better just to get them used to what it is they were doing. (Teacher interview, Fall 2000)

Based on the data provided in this paper, it seems to me that full integration of existing technology into science instruction could be actualized when teacher and students do not perceive these technologies as a complicated way of doing science. As indicated in this paper, advancements in technology may cause science teachers' perceptions to change over time especially when they see potential benefits of using that technology. Solid gains of incorporating MBLs and other technology into curriculum, such as decreased student labor and/or increased number of ways of doing science, will ultimately help science teachers develop new strategies in their transition to technologically enhanced classrooms. In this sense, provided enough time and necessary technical training, science teachers would better serve students in developing a higher level of understanding of the science content by using MBLs.

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WELLNESS PROFILE AND ATTITUDES TOWARDS INFORMATION TECHNOLOGY IN SPORTS: IMPLICATIONS TO ATHLETIC PERFORMANCE OF THE UNIVERSITY OF THE EAST ATHLETES

Luzviminda S. Macalimbon, Ph.D. Pscychology (Cand.)*

INTRODUCTION

Athletes are rare group of individuals who possess God-given GIFTS in the world of sports. Their dynamism and vitality are characteristics that make them unique from the rest, gifted or non-gifted. Moreover, the modern-day trend in their field of endeavor has even made them more great performers as they face the day-to-day real world of sports. This is the subject of investigation in this study, in an effort to understand their endurance as people who never cease to LOVE the WORLD of SPORTS.

Sports are fun. Sports provide a setting for people to develop their own identity by learning about their capabilities and their limitations. The potential or value development is present, while overly competitive and over commercialized sports undermine this.

Objective of the Study:

This study determined the variables that predict athletic performance of the University of the East athletes. The variables include the socio - demographic variables: age, gender, course, parent's occupation, type of sports, and kind of sports; wellness profile of athletes, and their attitudes towards information technology in sports.

Specifically, it sought answers to the following problems:

1. What is the socio – demographic profile of the respondents as to :1.1 age; 1.2 gender; 1.3 course; 1.4 parent's occupation; 1.5 type of sports; and 1.6 kind of sports?
2. What is the level of athletic performance of the athletes?
3. What is the wellness profile of the athletes as revealed by their wellness test in terms of : 3.1 spiritual; 3.2 social; 3.3 emotional; 3.4 intellectual: and 3.5 physical?
4. What are the attitudes towards information technology in sports of the athletes?
5. Singly or in combination, which of the following independent variable significantly predict athletic performance of the respondents of the study: 5.1 Socio-demographic profile; 5.2 Wellness profile; and 5.3 Attitudes towards information technology in sports ?

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Summary of Findings

1. Profile of the Athletes. The athletes were young belonging to the adolescent's stage (16-23 years old). It is the stage where the individual seeks to find out their talents and skills that he can improve and contribute to the society. At this stage, he tends to discover his weaknesses and strengths, He learns to accept himself.

Majority of the respondents were females, about 55 percent and 45 percent males. This is a good indicator for women There are sports that a woman can excel too.

Majority of the athletes were taking Business Administration course (58 %). The least among the courses are engineering and Arts and Sciences which obtained a rating of 6 percent respectively. The athletes had mothers and fathers who were jobless (48 % and 32 % respectively). The study also indicates that the educational orientation of parents allows them to let their children obtain a college degree, which they were not able to attain. Some parents were engaged in business, which accounts for 6 and 3 percent of the mothers and fathers respectively.

Majority of them were local players (69 %); who played nine kinds of sports: Soft Ball, Fencing, Taekwando, Table Tennis, Basket Ball, Track and Field, Chess, Soccer, and Athletics. This means that majority of the respondents are exposed to local sport competitions. This is a good training ground in order for them to compete in national and International competitions.

Level of Athletic Performance

The athletes of the University of the East performed satisfactorily in sports; majority or 56 percent did receive awards. Minor awards vary from 0 to 20 awards; and major awards range from 0 to 25 awards.

Wellness Profile of the Athletes

The overall wellness profile of the athletes was Above Average (mean = 2.03): Spiritual (Mean = 1.78); Emotional (Mean = 2.07); Social (Mean = 2.13); Intellectual (Mean = 2.06); and Physical (Mean = 2.13). According to Heath (cited by Donatelle et al. (1991) wellness in spiritual, emotional, social, intellectual, and physical aspect is a way of life characterized by an individual to adapt to an ever-changing movement towards optimal well–being.

The above average wellness profile of the athletes of the University of the East reflects their determination and effort to be healthy; flexibility and adaptability to a variety of circumstances, developing a sense of meaning and affirmation in life; understanding that self is not the center of the universe; compassion for others; the ability to be unselfish in serving or relating to others; depth and satisfaction in intimate relationship. These are the traits that characterize the athletes involved in the study.

Attitudes Towards Information Technology in Sports

The attitudes towards information technology in sports of the athletes is generally "moderately positive" (Mean = 3.13).

A major advancement in man's history, information technology is a relative new in-thing in the Philippines (Mangundayao, 1998). The athletes in an effort to possess superb ability, considers information technology phenomenon a less important tool in athletic performance; despite the fact that it has altered the way the workers in business and economics, psychology, medicine, sociology, and education, among others, live and interact with each other and the ways and means in which they do things.

The U.E. athletes had moderately engaged themselves in the use of Information technology, like the computer-based or INTERNET-based games of basketball, chess, among others to enhance their athletic performance.

Predictors of Athletic Performance

The predictors of athletic performance are: type of player (Beta = .607, t= 3.815, p = .000); information technology in sports (Beta= .331, t = 3.036, p = .004; and course (Beta = .240, t = 2.236, p = .029). The positive Betas of the three predictors suggest that national and international players who have positive attitudes towards information technology in sports, and are enrolled in Arts and Sciences, Computer, and Education courses have high athletic performance.

The adjusted R square value of .301 suggests that 30.1 percent of the variance in the athletic performance of the respondents could be due to the three predictors.

Type of player is the best predictor; which means that national and international players tend to be high performer athletes than the local players.

The predictive ability of attitudes towards information technology in sports is an assertion of Mangundayao's (1998) finding that in the 21st century learning environment CAI prepares the student in meeting the challenges of the time; of Karagiannidis and Tarabania's (1999) contention that that the rapid evolution of information telecommunication technologies (IT&T) offers new opportunities for the improvement of educational process. The adoption and exploitation of the emerging IT&T application and services is expected to have significant impact on the quality of education (in this study, athletics) and life-long learning offered to the citizens of information society.

Course taken by the athletes could not be undermined. It is a predictor of athletic performance. Ones course develops the player's personality especially in proving oneself in the sports arena.

Recommendations

1. Information Technology (IT) integration in the athletics curriculum should be implemented. This is a vital force in improving athletic performance. IT has so much to offer in the world of sports; which may provide athletes exposure and experiences, in playing one-on-one with international player via the Internet (Chess playing with other competitors in other parts of the globe) which would enhance their athletic performance. (Assessing later the effect of IT exposure in sports of the athletes).

2. National and international players should be accorded full support in all aspects like rigid training, education, and moral and financial etc.; since most of them have jobless parents, to highly enhance their athletic performance and prepare them for Olympic competition, here and abroad.

3. Further research should be done to examine athletes' Physical Fitness and Wellness.

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CHANGE CREATION AND CHANGE MANAGEMENT: TWIN KEYS FOR THE SUCCESSFUL INTEGRATION OF TECHNOLOGY AND EDUCATION

DALE W. LICK* AND ROGER KAUFMAN**

Most change models for the integration of technology and education are reactive: *change management*. While this is vital due to relentless change, it only deals with one side of the "change story." Missing is *change creation*: a proactive approach to understanding and modifying educational and institutional cultures for the meaningful and successful integration of technology and education (Lick & Kaufman, 2000). Change creation, while including change management, moves beyond it while dignifying its importance. This paper links change creation and change management – key change partners – to strategic planning and thinking and provides steps and tools for educational and institutional change involving technology that seriously considers their cultures. Included are discussions of: critical change elements; change creation; the universal change principle for successful change; the essential nature of "learning"; practical applications; and an outline of a creation change process.

CHANGE FAILURE

Most significant change efforts relating to technology and education fail or are only partially successful because, typically, educational leaders:

Had not fundamentally reframed their own thinking relative to major change, such as introducing technology into their system before defining if and what kinds of technology could add value for stakeholders.
Had implemented a strategic planning approach for the integration of technology and education that was incomplete and inadequate.
Had failed to prepare their organization for the important transformations that major educational technology change requires.
Had not provided and implemented a detailed, structured, disciplined transition plan relative to integrating technology and education.

CHANGE

The nature of our times and the explosion of technology are driving change, as the American Association of University Professors nicely relates for education (www.aaup.org/spcintro.htm):

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> The world of higher education is in the midst of accelerating and sometimes turbulent change. ... modes of communication are profoundly affecting the work of faculty members: they are reshaping the processes of teaching and learning, redefining the role and authority of faculty members in organizing and overseeing the curriculum, and altering the bases for evaluating students -- and faculty -- performance.

However, educational institutions and their people typically resist, ignore, or sidestep the realities and impact of change, all losing and self-defeating responses. Instead, they must partner with change and use it to create the future that serves society and their institutions best. This means that an institution and its people must become effective leaders and practitioners of *change creation*.

CHANGE CREATION

Change creation is the process whereby an institution and its people:

1. Seek and welcome planned change as a vital element for future success.
2. Define the future they, with their partners, want to design and deliver.
3. Develop and implement a comprehensive change transition plan to create the designed future and continuously improve it while moving closer to the desired future. (Lick & Kaufman, 2000)

This means educational leaders and their institutions must be proactive, taking genuine responsibility for leading change; effectively defining and planning for the desired change; comprehensively preparing the organization for the planned change; and developing and implementing a change approach that capably transitions its people, processes, and culture from the existing paradigm to the desired one.

LEARNING

Learning, in the most general sense, is essential to change creation, as learning organization expert Peter Senge (1990, pp. 13-14) explains:

> Through learning we re-create ourselves. Through learning we become able to do something we never were able to do. Through learning we re-perceive the world and our relationship to it. Through learning we extend our capacity to create, to be part of the generative process of life.

UNIVERSAL CHANGE PRINCIPLE

Unfamiliar major change generates fear and anxiety in people often requiring them to radically shift their thinking, feelings, beliefs, and behaviors. This and *learning* are the basis for the seemingly simple but powerful overarching principle for change creation, the *Universal Change Principle* (Lick, 1999).

Universal Change Principle: *Learning must precede change.*

Leaders must consciously ask the question, "What learning must take place and with whom before this change effort will be successful?" For a new educational technology project, we must ask questions as: why the new approach is critical to improving student learning; what the implications are for students, faculty, and the department; when and how this new approach will be implemented; and what will be the support and rewards for effectively implementing the new approach.

A CHANGE CREATION PROCESS

The general steps in the change creation process, including technology and education efforts, are outlined below (see details in Lick & Kaufman, 2000).

Step One: *Leadership Team Preparation for Planning and Change.*
Step Two: *Institutional Preparation for Planning and Change.*
Step Three: *Mega-Level Strategic Planning.* (See Kaufman 1998; 2000)
Step Four: *Statement of the Change Project.*
Step Five: *Scope of the Change Project.*
Step Six: *Communication of the Change Project.*
Step Seven: *Diagnosis of Status and Capacity of the Change Project.*
Step Eight: *Detailed Implementation and Transition Plan.*
Step Nine: *Execution, Monitoring, and Refinement of the Transition Plan.*
Step Ten: *Communication of Progress to Stakeholders.*
Step Eleven: *Evaluation of Lessons Learned and Final Results.*

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THE WEB AS AN EFFECTIVE TOOL FOR KNOWLEDGE DEVELOPMENT: A CASE EXAMPLE OF POTENTIAL INNOVATIONS IN RESEARCH METHODOLOGY

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The goal of this project is to examine the field of play therapy, a popular psychosocial intervention used with children. The use of technology has been integrated throughout in order to facilitate sound research methodology, critical discussion of the issues, and significant cost savings as compared to alternate methods. Through a cooperative agreement with the Association of Play Therapy (APT), we will be able to contact their organization's entire membership and ask them to complete an on-line survey. Our next step is to review the entire body of empirical outcome literature in the field. We are in the process of completing an article analyzing this research using an innovation, an adjunctive website that offers the reader additional information and an opportunity for interaction with the authors. Finally, a statistical method, concept mapping, will be for analyzing the qualitative data gathered from the member survey.

USE OF THE WORLD WIDE WEB

Our on-line survey has been posted through the use of a web-based commercial survey vendor. Although we had initially considered other options (such as authoring it and publishing it on the web ourselves), it became readily apparent that the commercial web-based survey offered significant advantages. The vendor we used, www.formsite.com, was very user-friendly and offered a number of helpful features. Among those were SSL security, the option to block multiple responses from a single computer, and the ability to download the survey data in a comma-delineated format that could easily be imported into a spreadsheet or statistical software package.

Through the use of a commercial web-based survey, researchers can create on-line surveys at low cost. Since these are web-based, only a basic level of familiarity with the Internet is required, as opposed to more sophisticated knowledge of specific webpage-authoring software. We feel this option may have significant advantages for graduate students and others interested in putting surveys on the web in an expedient, cost-effective manner. We also found the cooperation of APT invaluable, as they are encouraging their membership to participate in the research. As the study is ongoing, we do not yet have a final response rate, but we feel we are benefiting from having the APT homepage linked to our survey.

We are also attempting to collect the entire body of outcome literature around the subject of play therapy. Since this intervention has existed for more than half a century, this consists of hundreds of articles. We are reviewing the

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[°] Assistant Professor, Florida State University School of Social Work most rigorous experimental studies in a forthcoming journal article, but due to practical page limitations, it is unrealistic to hope to list the entire body of literature in our article. However, many of the non-empirical articles contain valuable information and we want to list this information as a resource for interested students and academics. Therefore, we have posted a listing of the play therapy literature on the World Wide Web; readers of our article will be referred to the website for further information. This offers an innovative manner of working within article publication limitations while offering useful information to interested parties.

We also envision a system where various academics might act as 'electronic archivists' and keep a running list published on the web of the literature around the topics in which they are actively engaged. This would not replace normal literature searches but could act as a complementary approach for students and academics searching for such information.

For our purposes, this website also contains a bulletin board that allows readers to comment and critique the field in general and our articles in particular. Journals do contain letter columns that are supposed to serve a similar purpose, but they are subject to time-delay and space limitations. An electronic format allows instantaneous response, unlimited space, and the building of a critical electronic community. Some journals already offer a similar approach, such as the *British Medical Journal*. For those that do not, we suggest that the authors create such an environment themselves.

ANALYSIS OF THE EMPIRICAL LITERATURE

Our approach follows a Popperian critical rationalist methodology based on falsifiability as the criteria for scientific evaluation (Popper, 1979; 1989; Gomory, 2001). This simply means that we take all of the relevant literature and subject it to an 'internal audit' of its theoretical and empirical claims. This approach can be opposed to another currently popular alternative that is claimed to have useful descriptive and inferential properties called meta-analysis. Where meta-analyses generally accept the findings of the individual studies under review as to empirical "fact" and method, we seek to rigorously test the claims of each study as to the method used and the "facts" found by attempting to falsify such claims (i.e. can the methodology of the study actually accomplish what is claimed for it or are the data and its interpretation reliably and validly examined). This critical 'internal audit' we believe leads to a more accurate assessment of research than methods like meta-analyses (for the problems of meta-analyses see Oakes, 1986, chiefly pp.157-163).

CONCEPT MAPPING

Qualitative research has historically been fraught with problems of subjectivity, the lack of staying true to a particular methodology, and research findings that may be difficult to interpret. To address this limitation, this project is utilizing concept mapping, a statistical technique designed for the management and interpretation of certain types of qualitative data. The technique utilizes multidimensional scaling and cluster analysis in order to derive a visual representation, or map, of the conceptual relationships among a set of qualitative statements. This methodology has been utilized in a variety of settings and with a variety of populations – from strategic planning amongst fortune 500 companies to a local Big Brothers/Big Sisters program (Concept Systems, 2000; Galvin, 1989). It has even been used to map the conceptual image of God (Kunkel, Cook, Meshel, Daughtry & Hauenstein, 1999). Computer software has been developed specifically for this purpose (Trochim, 1989), and will be demonstrated with potential applications to web-based research and innovative methodological designs highlighted.

CONCLUSION

Our project has significant implications for those in higher education who are pursuing outcome research. We examined one well utilized therapeutic intervention in the important area of child welfare, including the demographics of play therapists, the entire body of relevant literature for the field, critical analysis of the scientific basis for claims of efficacy, and conceptualization of the qualitative data through the use of concept-mapping software. Furthermore, we made some suggestions, including the idea that web-based commercial surveys may be cost-effective for use in academia and the proposal that academics begin acting as 'electronic archivists' in order to promote easy access to the relevant literature in their field of study. Our published articles on these topics will refer to our website, which will provide additional information and a critical feedback loop, a practice we encourage other authors to begin engaging in.

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"CARLA" (COMPUTER-ASSISTED RECORDED LANGUAGE ASSESSMENT) - SOFTWARE FOR EVALUATING STUDENT ORAL RESPONSES

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More and more, teachers are being encouraged to integrate computers into their teaching programs (McLafferty, 2000). Some encourage their students to use software designed to enrich the curriculum, others have their students use computers for research. Fewer are using computers for testing purposes. However, as Gronlund suggests, "as computers become more widely used in the classroom, we can expect computer-assisted testing...to play an increasingly important role". (Gronlund, 1998, p. 131). This belief is echoed by Hall (2000) who states that "computer-based testing is the wave of the future" (p. 15).

At the University of Windsor, software has been developed to allow instructors to evaluate their students' progress orally. The software, named "CARLA", has been particularly welcomed by foreign language instructors who must evaluate the oral language skills of their students on a regular basis (Gonzales, 1989). "CARLA" would, however, be well suited for evaluations in any situation where oral responses were desirable. The software could be especially beneficial in the case of exceptional students who have difficulty in responding to written questions. Instructors in ESL (English as a Second Language) programs would also find the software very useful.

"CARLA" is capable of delivering pre-recorded instructions and questions to students in any language. It also has graphic and video capability which makes it possible for teachers to include prompts for the students in the form of sound material, still pictures, moving pictures and written text. Thus questions may be tailored to appeal not only to aural learners but to visual learners as well. This fact plus the interactive nature of the software help instructors to meet the needs of students with different learning styles, a key element in good teaching practice (Grasha and Yangarber-Hicks, 2000). Furthermore, instructors can use the prompts to establish a context for the questions, thus helping to ensure that the test has content validity. (Brown, 1987).

The software may be used in one of two modes: practice mode which allows students to listen to questions and record answers as many times as desired until they are satisfied

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with their response and test mode in which students hear each question and are then given one opportunity only to record their answer. The software requires students to record their responses in a controlled format. The program permits instructors to specify a time limit for responses which are then stored on the computer hard drive or a school server. Instructors are then able to retrieve the student responses and mark them from any computer to which they have access. When evaluating the recordings, instructors are able to record and append their own comments and reactions to what the students have recorded. Thus, when listening to their marked recordings, students are able to hear not only what they recorded but also their teacher's comments and corrections. This makes the feedback students receive meaningful and timely, two factors which are of the utmost importance if students are to benefit from the evaluation (Hall. 2000).

There are a number of advantages associated with oral evaluations done with "CARLA":

- teachers may author their own questions if they wish to tailor their questions to specific material taught in class;
- students frequently tend to feel more relaxed responding to a machine than in front of a teacher;
- the software has video as well as audio capability;
- teachers can mark the responses at their convenience, even at home if they have a computer there;
- teachers can play the same response as many times as they wish, thus allowing them to focus on different aspects of the student's speech at different times. The result is a fairer and more accurate assessment;
- teacher comments can be inserted into the recording so that students can play back not only their own answers but also the teacher's corrections;
- the software can either be used in a computer lab setting or on a single computer by one student at a time. This allows teachers who have access to a computer lab in their school to test a group of students at once or alternatively, they can give the disk to students individually and have them record their answers on a computer at the back of the classroom while the regular lesson is taught by the teacher;
- the volume of students' recorded work can be increased or decreased even after the recording has been completed according to the marker's preferences.

"CARLA" is currently being used in pilot studies in elementary and secondary schools as well as at colleges and universities throughout North America. Anyone wanting further information about "CARLA" or who would be interested in piloting the software at their institution should contact either of the authors of this paper. Additionally, interested parties may visit the project website at:

http://www.netresources.ca

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FACULTY ADOPTION OF THE CAMPUS INTRANET SYSTEM FOR POSTING GRADES: A DIFFUSION STUDY

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Middle Tennessee State University has adopted a campus Intranet system designed to streamline many of the administrative functions normally handled through droves of paperwork. The system is called WebMT. Among the features offered to students by the system are: registration, drop/add, withdrawal, course listings and search options, class schedule viewing, degree audit, registration confirmation, grade inquiry, and transcript viewing.

While the system was designed primarily for students, many of whom live 30 miles or more from campus, the Office of Information Technology (OIT) added functions for faculty as well, including: viewing class rosters, student class schedules, and—the subject of this paper—posting grades. While this function is being examined from the faculty perspective in the current study, this practice of posting grades electronically also benefits students, who promptly have access to their final grades.

Selected faculty members were allowed to post grades during the testing phase of the system in the summer of 1998. Once this phase was completed, faculty members were notified via e-mail that the system was ready for operation for the fall semester. No formal training was offered, but personnel in the OIT office were available to answer questions.

OIT prefers that faculty use WebMT, especially for posting grades, because the program is automatic, less labor intensive, reduces potential for errors, and reduces paper usage. Before WebMT was introduced, and often even still today, faculty members transcribe grades via bubble sheets—a labor-intensive process for all parties. Faculty members then submit the grades to the records office, which performs a "headcount" of all records, checks for correctness, and passes the sheets to OIT, which then scans the sheets. Due to errors, many of these sheets must be returned to the records office, which gives them back to faculty to correct. Some common errors include turning in incomplete sheets, completing sheets in ink rather than #2 pencil, or making accidental markings, such as assigning an "A" for a Pass/Fail course. WebMT, on the other hand, contains a system of checks and balances to prevent these types of errors.

This paper assesses who has or has not adopted the technology and why. The study applies diffusion theory to compare characteristics of adopters and non-adopters at this stage of the diffusion process. A survey was administered to the faculty on campus via e-mail with a follow-up hard copy delivered to non-respondents. Survey A was sent to the 26% who use the system. Survey B was sent to the remaining 514 faculty members who do not use WebMT. Respondents were asked from which source they had first heard of the system, what other technologies the faculty member had adopted, ease of use, attitude toward

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technology, distance from campus to residence, and concerns for security and reliability.

Although the system has been in place since 1998, only 26% of faculty used WebMT at the time of the study. Of those who do not use the system, 79% had at least heard of WebMT, which is the first step in the innovation-diffusion process. In diffusion theory, the awareness stage provides information that the innovation exists. Once a potential adopter is aware of the innovation, he or she seeks information and goes through an innovation-decision process: to adopt or not adopt.

Faculty members, both users and non-users, were asked how they had heard of WebMT. Most users were made aware through sources other than peers and supervisors. The OIT newsletter was cited as the most common response for users; for non-users, an e-mail sent out to faculty regarding grade filing. E-mail and peer information also ranked moderately high among users (see table 1).

Table 1 "How did you hear about WebMT?"*

ANSWER		USERS	NONUSERS	TOTAL
OIT Newsletter	Count	133	21	154
	%	53%	14%	38%
E-mail from Records	Count	99	123	222
	%	39%	79%	55%
Informal/Friend	Count	92	9	101
	%	37%	6%	25%
Flyer/Announcement	Count	61	54	115
	%	24%	35%	28%
MTSU Employee	Count	24	3	27
	%	10%	2%	7%
Formal/Superior	Count	18	23	41
	%	7%	15%	10%
Student	Count	5	8	13
	%	2%	5%	3%

* Multiple responses allowed.

WEBMT AND TECHNOLOGY USE AND ATTITUDES

The next stage in the diffusion process is to gain an understanding of the innovation and evaluate the relative advantage of adoption. Faculty members who are non-users reported having general knowledge of WebMT, but were not aware of its functions. Non-users tended to ask more "how do I…?" questions on the comment part of the survey. To address this knowledge gap, the OIT has inserted a "tips" feature onto the WebMT faculty site, allowing faculty to quickly view various functions with "how to" instructions.

WebMT users reported a higher gratification (than perceived gratification from non-users) from entering data remotely and having it processed immediately. A moderately strong relationship (.60, $p<.01$) was found between Internet (and e-mail) use and WebMT use, indicating that faculty who use other computer technologies such as e-mail and the Internet are more likely to use WebMT. There was also a relationship between ratings on an eight-item technology attitude scale (Cronbach's α=.74) and use of the system. The average score in the scale for users was 34.36, compared to a score of 31.47 for non users (t=6.43, p<.01). This suggests that the higher one's attitude toward technology, the more likely one is to use WebMT. Eighty-three percent of users of WebMT rated ease of use, or perceived ease of use to be very easy or somewhat easy, compared to 40% of non-users. Many non-users (44%) were also skeptical of security of transmitting grades online.

USE OF WEBMT AND DEMOGRAPHICS

Significant relationships between use of the system and some geographic characteristics were found. While there were no significant differences found with regard to demographic characteristics of age, gender, academic rank and years of service, differences were found for residential distance from campus and college. WebMT users on average live farther from campus than non-users. This is consistent with the popularity of telecommuting in workplace technology studies. The rate of WebMT usage is higher among faculty members in the colleges of Business, Liberal Arts, and Mass Communication, while the colleges of Basic and Applied Sciences, Education and Developmental Studies showed a lower propensity for WebMT use (p<.01).

CONCLUSIONS

According to users, the WebMT system is gratifying and easy to use. Traditional demographic factors associated with adoption were found to be insignificant, perhaps because the adoption is being studied in a workplace setting, and the technology is equally available to all faculty members. Faculty members who use other technologies are more inclined to early adoption. Respondents who score higher on the technology attitude scale are more likely to adopt the grade-posting system.

This study shows that psychographic characteristics of technology attitudes and perception are stronger predictors of adoption than traditional demographic characteristics. There were no significant distinctions between users and non-users with respect to age, gender, academic rank, or years in service.

Efforts by the Office of Information Technology to inform the faculty about the system have been partially effective—people are aware of the system, but not necessarily aware of its functions and capabilities. Perhaps the traditional opinion leader tenet of diffusion theory will hold true: that the group of non-users will become informed by the opinion leaders and start to adopt the technology in the near future. This is certainly suggested by the fact that over one-third of users learned of the system from a friend or peer.

Adapted from: Keltner, K. (2000). *Diffusion of innovation applied to an organizational intranet* (Masters thesis, Middle Tennessee State University, 2000).

AUTOMATIC CHARACTERIZATION OF COMPUTER PROGRAMMING ASSIGNMENTS FOR STYLE AND DOCUMENTATION

Dulal C. Kar*

INTRODUCTION

Program readability is important for future maintenance of a program – a common practice in industry. Readability and understandability of a program can be enhanced by following some consistent program developing style and including enough and appropriate documentary comments at various places in the program (Dale, Weems & Headington, 2000; Coplien, 1991). In class programming assignments, students are expected to follow some guidelines consistently for style and documentation. Grading programming assignments for style and documentation for large classes is a very time consuming process as the process often involves meticulous checking as well as writing some feedback with suggestive comments for future improvement. Due to resource constraints, sometimes only one or two assignments from a set of assignments are randomly chosen for manual checking of style and documentation. Consequently, students hardly get any chance for improvement in style and documentation in future assignments.

This work presents an automatic characterization system that can check a student's program for style and documentation based on some guidelines and provide immediate feedback to the student if certain elements or components are missing or lacking in the program. An instructor can use such system to find out the students who are not following consistently the guidelines for style and documentation. Such system can also be used to categorically grade students' works on style and documentation.

CHECKING DOCUMENTATION

Checking program documentation requires understanding of the program as a whole and its individual components. Consequently, automatic checking whether some documentary comment is relevant and meaningful is not possible, at least with current technology and knowledge. However, it is relatively easy to check the presence, absence, or amount of documentary comments in a program.

In a C++ program, documentary comments can occur in three forms: *block comments*, *single-line comments* and *trailing comments*. Block comments containing multiple lines of comments are used at the beginning of a program, a module, or a function.

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Single-line comments or even block comments are used at the beginning of a logical block of code that usually start with *for*, *while*, *do-while*, *switch*, or *if* statement. Single-line or block comments are also used at the beginning to describe a data structure or a class abstraction. Trailing comments are used to describe variable, constant, or function parameter declarations. Trailing and line comments are also used for program statements. We assume that in an introductory programming class, programs written by students are small and simple enough that students put documentary comments only at designated places as set by the course instructor. Accordingly, the automatic checking process can be carried out as follows:

1. Find the beginning block comment of the program, count lines and words in the comment block.
2. Locate each function or method definition, class declaration, structure declaration, and so on in the program, check for existence of any documentary comment block as heading, and count lines and words in the heading accordingly.
3. Find the location of each logical block of code beginning with *for*, *while*, *if*, *do-while* or *switch* statement, check for the beginning block or line comments for the code segment, and count lines and words in it.
4. Find the first occurrence of a variable name, a function parameter, or a constant, check for any trailing comment on it, and count words in the trailing comment.
5. Check trailing comments for statements in a function, module, or program and count words in each comment.
6. For each of the above steps, report any missing documentation with appropriate position information such as line number, function or module name, etc.
7. Calculate statistics on various counts and report them.

CHECKING PROGRAMMING STYLE

Program readability is essential to understanding of a program. Adopting a good programming style for the development of an entire program is important for its readability. The following style rules can be considered for characterizing and checking a student's program written in C++ (Henricson & Nyquist, 1992):

1. Use meaningful names for all identifiers. Checking of such rule is not possible by an automated system. However, the identifier naming convention, structure, and size can be checked easily.
2. Do not exceed 80 characters for a statement on a line.
3. Limit all functions, methods, classes, structures, etc. within 40 lines.
4. Write only one statement per line.
5. Indent all statements in a logical structure such as inside a *for* loop, a *while* loop, an *if* block, a *switch* block, a class or structure declaration, a function or method definition, and so on.
6. Use whitespace before and after a binary operator.

7. Leave at least one blank line before the beginning of a logical structure such a function, a class or structure declaration, a *for* loop, and so on.
8. Limit number of parameters in a function to 7.
9. Indent continuation of a statement.
10. End a logical block with a closing brace on a separate line with the same spacing as the first line of the block.

Similar to checking program documentation, parsing and counting techniques can be used to check a program for compliance of all the above rules for programming style.

IMPLEMENTATION

A prototype system has been developed to automate the process of characterizing students' programs written in C++. A student can submit a program to the system from any host on Internet through a client program. After checking the authenticity and enrollment of a student in a class, it performs the analysis of the program for style and documentation. It produces a report, similar to an error report generated by a compiler, with line numbers of all lines in the program that do not follow the rules for style and documentation. It also produce a report on statistics of comment words, comment lines, comment blocks, programming statements, programming blocks, etc. It then returns the complete report on the characterization of the program to the student via e-mail.

CONCLUSION

An automatic characterization system can provide immediate feedback on some student's program for style and documentation. Students can use such feedback for improvement or an instructor can use such feedback grading or warning a student. A prototype system for the purpose has been developed and found effective in characterizing students' programs.

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WIRELESS LOCAL AREA NETWORKS: ULTIMATE FREEDOM IN TEACHING AND LEARNING ANYTIME, ANYWHERE WITH TECHNOLOGY

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INTRODUCTION

Internet, a giant structure of wired networks connecting all computers on-line all over the world, is a vast source of information. Because of easy access to Internet, a computer user is no longer restricted for information by the limited capacity of the stand-alone machine or by the aggregate shared capacity of the home local area network (LAN). The recent development in Wireless LAN (WLAN) technology has extended all Internet services to mobile users anywhere, anytime. Many academic institutions after some experimental phase are embracing the technology to provide ultimate freedom in accessing and using information for their students, faculty, researchers, and staff. It is changing the environment, culture, and life for the academic communities in many places in a campus such as classrooms, labs, libraries, and dormitories in an academic institution. Students and educators are deriving many benefits from the technology as it provides mobility, flexibility, and versatility to the user. In this paper, we discuss usefulness of the Wireless LAN technology in an academic institution, its scopes for academic uses, and some solutions to cope with some of its limitations.

WIRELESS LAN TECHNOLOGY

Wireless Local Area Networks are essentially extensions to traditional wired local area networks (Baldazco, 1995; Boyle, 1996). A device called an access point is attached to a traditional LAN through an Ethernet port. Through the access point, mobile or fixed wireless workstations can communicate with any host on the traditional wired network infrastructure. Each wireless workstation is installed with a wireless LAN adapter that communicates with the access point using radio waves or microwaves. The data transmission rate of current WLAN adapters ranges from 2 Mbps to 20 Mbps, and the price of such adapters ranges from $250 to $800. An access point can be equipped with an outdoor antenna to provide coverage of long distance. The transmission range of most WLAN products is from 20 feet to 800 feet. On average, an access point can handle 20 to 30 wireless workstations Installation of many access points on the traditional wired network is required to provide extensive coverage all around a campus. Ethernet ports in classrooms, dormitories, libraries, hallways, labs, etc. are used to attach access points. Other forms of Wireless technology are also available for networking as well.

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CHANGING ACADEMIC ENVIRONMENT

Wireless LAN technology is affecting and changing academic environment in many different ways (Hills, 1999; Preston & Radulovic, 2000). Libraries in some academic institutions allow checkout of wireless workstations, so that a student does not need to sit in a crowded computing lab and do his/her work. Instead she/he can prefer some quite study room and sit with the wireless workstation and learn as he or she browses Internet for information. Students can go on online anytime, anywhere from green lawns, food courts, cafeterias within the campus at their leisure time if desired. Any science lab such as the chemistry lab or physics lab can co-exist with such an ad hoc computing lab in the same room. It does not require exclusion of one or the other. Access to information and data collection can simultaneously be carried out, for example, from a greenhouse or a biological experiment station. There is no need to schedule a class in a room with a wired LAN. Classes can meet anywhere. A surveying class, for example, can meet in outside in a field, and can still access Internet for information as well. Here are some specific examples on such effects and changes:

Class Mobility. Usually computer lab facilities in an institution are limited and may not be available for all courses for all or most of the time. Wireless LAN provides a welcome solution to such problems. A class can meet in any classroom, which can be turned to a computer lab with wireless workstations and a student can be an active learner who can access or share information whenever needed. In addition, in this environment, through the access point, an instructor can exercise single-point controlling and filtering of on-line information for the class as well.

Class Flexibility. Many courses taught on case studies of problems are usually scheduled in classrooms with special sitting arrangements and computing facilities for group study. However, many other courses do not require such arrangements for an entire term. Depending on the need, such a class is organized to create a group learning environment with round-table like sitting arrangements and next time the same class is organized for traditional delivery of lectures. Wireless LAN technology provides a great flexibility for such classroom environment with access to on-line information at the same time.

Research Productivity. With the aid of a wireless workstation at a research experiment station, research data can be collected and immediately uploaded to a central database. In the same way, research results can be downloaded at the site of the experiment for immediate comparison with the results of the current setup. Distant monitoring of an ongoing scientific experiment and the corresponding data collection from the experiment can be carried out now from anyplace. As a result, many frequent visits to the site of the experiment can be saved.

Classroom Cleanliness. Wireless LAN environment provides a clean computing lab environment compared to a traditional computing lab, as there is no need to connect workstations with wires and power chords. Use of compact notebook or laptop computers in the class provides hazard-free environment. It is relatively easy to move around in such a class. Compared to a traditional wired computing lab, a class with wireless stations provides a instant computing lab environment that is more space efficient and provides better space utilization. As wireless workstations are laptops equipped with WLAN cards, they can be folded and put aside during non-computing class activities such as a test or a serious discussion of a topic or a lecture.

AVAILABILITY, LIMITATIONS, AND CONCLUSION

Some academic institutions require students to buy a computer with a wireless LAN adapter card. In some institutions, wireless LAN adapter cards can be checked out for short-term use. Some academic institutions are making various efforts to provide their students a complete wireless workstation. Some are making wireless workstations available to students on checkout basis or on lease basis. Some institutions have cart services to the classroom with wireless workstations on demand basis. As prices of WLAN adapters are falling, perhaps students who can afford a computer would easily be able to afford a WLAN adapter for his or her notebook.

Speed is still a problem in a wireless LAN, which is often the cause of annoying delay of downloading of large multimedia document during a session of a class. Also an access point can be flooded by the requests of many operating wireless workstations causing a bottleneck effect when all users want to access the same time. A solution to this problem is to have more than one access point installed to serve the group of wireless workstations. Seamless roaming of mobile stations for Internet access is still an issue in some situations. The limited life of battery power of a current laptop or notebook computer is sometimes a problem for continuous use, particularly if a student has two or three consecutive classes to attend. Lighter and less power consuming portable computers are more desirable than the existing ones. The cost is still a deciding factor in deploying WLANs in a campus. Fortunately, like many computing products, the prices of WLAN products are going down every month. In many situations, as speed increases, wireless LAN will be cost-effective solution to information access with less wire, maintenance problems from anywhere, anytime.

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NETWORK PRINTING IN A COLLEGE OF EDUCATION: COST SAVINGS AND REDUCED SUPPORT

Dane Hughes*, John Gretes**

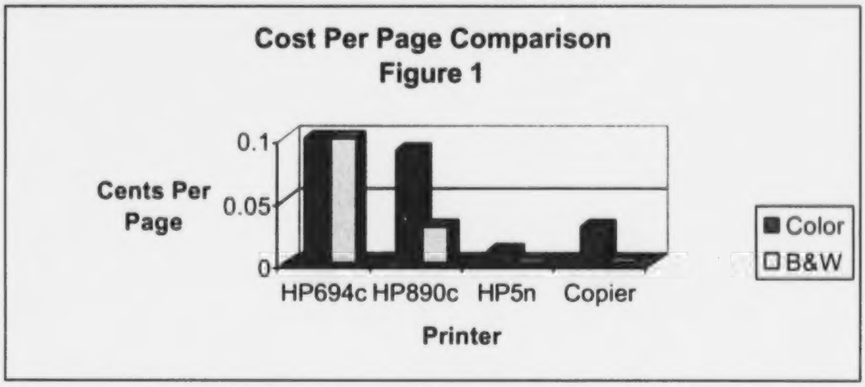
THE PROBLEM

In 1996, all faculty had individual printers connected to their desktop machine. Some of these printers were laser printers, most were ink jet printers. There were 120 different printers each requiring its own paper supply, toner or ink supply and troubleshooting. The Office of Information Technology (OIT) logged 173 help tickets directly relating to local printers. These help tickets ranged from changing toner or ink cartridges to clearing paper jams in local printers.

THE PLAN

The OIT began to investigate the benefits of network printing. The annual cost savings were projected to be $11,000. The College was spending an average of $300 per printer for each faculty member. The average number of machines replaced each year was 30, this maintains our four-year replacement cycle. The immediate hardware cost savings was $9,000. The cost of consumables was projected to fall with the adoption of network printing.

Figure 1 includes cost per page data supplied by Hewlett Packard.



Cost Per Page Comparison
Figure 1

The average ink jet cartridge costs $25, the average toner cartridge costs $95. But the life span of the cartridge is where the laser outshines the ink jet. The typical toner cartridge last 11,000 to 15,000 copies, while the typical ink jet cartridge prints less than 5,000 copies. Once the initial outlay for the 7 new laser printers was paid, the College should begin to see cost saving mount over time. This saving comes from the durability and reliability of the laser printers over the ink jets.

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THE OBSTACLES

Most faculty were reluctant to give up their local printers. The most common issues raised by faculty were confidentiality, security, and inconvenience. The inconvenience factor was combated by printer location. The OIT placed printers in each departmental office, where faculty needed to go for other purposes such as mail pick up and deliveries.

The security and confidentiality issues were addressed by supporting the policy that lead secretaries, chairs, directors, and deans would keep their local printers in order to print confidential student and personnel reports. But these printers would also be upgraded to laser printers to maintain consistency. Faculty who were concerned about security and confidentiality were encouraged to have the lead or departmental secretaries print sensitive materials. Making sure departmental printers were in secure areas that could be locked and only entered by appropriate faculty and staff helped reduce some of the concern in this area. The next issue involved special paper and color printing. The OIT solved this by purchasing the network printers with multiple paper trays that the departments could configure for letterhead, legal, etc. Faculty training sessions were held to show them how to switch between the different types of trays. Color printing was resolved by directing faculty to the Faculty Development Lab, which was already equipped with a Hewlett Packard DeskJet 1600c.

THE IMPLEMENTATION

The College purchased 7 new Hewlett Packard LaserJet printers with multiple paper trays and network cards. The average network printer cost was $2,000 for a total investment $14,000. Network printing was simply integrated into our existing Novell network. These printers were placed in strategic locations in the College to make access as easy as possible. Most printers were placed near faculty mailboxes to minimize additional trips and increase security. The existing local printers were not removed. The OIT and the College implemented a new policy that no College funds would to be spent on local printing, but existing printers would be supported until the end of their useful life. For disaster purposes the OIT purchased a spare, less sophisticated printer that could replace a broken network printer in less than 30 minutes. Training sessions were held to help faculty switch between their printers, select advanced printing options, and basic troubleshooting for off hours problems that may occur.

THE RESULTS

The College now has only a few local printers left. Most have been phased out and some have even been removed at the request of the user. None of the original network printers have experienced any failures, only routine maintenance has been performed. The faculty has taken quite well to network printing. There have been no major unplanned network outages that have caused interruptions in printing and network services. The positive feedback the OIT has received includes, faster printing, higher quality printing, and more reliable printing. The negative feedback we have received centers on having to walk too far to pick up print jobs and problems with manual feed print jobs. We are working on solutions to these problems. The cost savings have been better than projected. Not only did the OIT eliminate $9,000 annual cost of replacing aging and failing printers, but consumables costs fell more than projected. The College has lowered its paper cost, most likely due to faculty limiting their printing to only necessary print jobs since they must pick them up. Faculty and staff have reported an increase in more on screen editing skills. Toner costs were lowered because we are able to buy in volume to lower the unit cost and the laser cartridges are simply more cost effective per page than ink jet cartridges. These cost savings have allowed us to increase the faculty desktop replacement cycle and upgraded the color printer in the Faculty Development Lab to a color laser printer. The number of man-hours spent servicing printers and printer related issues has also dropped significantly. The number of help tickets related to printing has dropped by 765 percent to a total of 20 help tickets. According to recent help tickets, the most common printing issue is clearing network printer paper jams.

THE FUTURE

As the College moves to NDPS (Novell Distributed Printing Services) it will no longer be necessary to install printer drivers on each machine. When the user selects the printer from the network, if the driver is not already installed the driver is pushed down to the user. One plan in consideration is to allow all faculty access to the color laser printer from their office. This will be piloted with two departments to see how much the costs increase.

RULES OF THUMB

For any College or school looking to adopt network printing, the key to a successful project is to migrate slowly and communicate with the end users. Extreme and abrupt changes disrupt faculty and staff's work lives making them uncomfortable. By slowly phasing in the changes over time it makes the transition much easier. Below are some basic pros and cons of network printing to take into account when discussing the issues. This list is by no means exhaustive but it is a good means of beginning the dialogue.

PROS

- Laser printers have longer duty cycles
- Laser printers are more durable and more repairable than ink jets
- Laser printers have lower costs per page
- Keeping all printers the same or similar models reduces inventory costs for consumables
- Laser printers have higher quality output
- Laser printers are faster than ink jets

CONS

- Inconvenience, most faculty and staff will have to walk to pick their printouts
- Envelopes and special paper printing
- Network failures cause sharing printing to be interrupted

CREATING A COMMUNITY OF EDUCATORS

By Christopher Hohenberger   Root Learning, Inc.

Imagine how your school district would look if every single person at every level really understood how schools operated.

- What if every person in your organization really understood the big picture, including the economic, technological, competitive, and community realities of your school district?
  What if all of your people had an understanding of your strategy that was far more focused and meaningful than murky visions and missions?
- What if they understood your organization's core competencies, knowing exactly what skills would be required to achieve your strategic goals?
  What if they understood where you got your operating revenues from, how difficult it is to acquire, and what is really involved in running your schools?
  What if your people discovered that all community stakeholders are not alike?
  What if your organization went beyond today's "blue sky" rhetoric on reengineering and developed initiatives that really got results?

Many leaders would argue that lack of communication is one of the greatest obstacles to achieving change. We believe the real problem runs deeper. In many organizations, mistrust and fear are the real culprits, the biggest impediments to moving forward. The antidote, we believe, is knowledge–knowledge about the core organizational realities that shape an organization's future.

As former strategic planners, we spent a great deal of time with senior leaders of companies attempting to identify major environmental shifts that radically affected their business landscapes. We pointed out the threats and opportunities within specific industries. We crafted masterful strategic plans in multicolored, three-ring binders. Then, when we returned a year later, we found that our binders were invariably on shelves, collecting dust. The strategic plans were not implemented after all, and precious opportunities were lost. The same is true in many school districts that we encounter.

What began to emerge was a "Grand Canyon" between the *leaders* who could see what needed to be done, but who didn't have their hands on the levers of change, and the *doers* who had their hands on the levers of change, but who simply couldn't see the big picture. Leaders said, "This is our vision." Doers replied, "What does this mean for me and my people?" We began to understand that the only way to bridge that canyon was to provide everyone with a comprehensive, senior leader-level understanding of the most strategic organizational issues.

It became clear that competitive advantage was not determined by new textbooks, new buildings or even strategic thought, but by "change speed," "adaptation speed," and "learning speed." And organizational learning speed is not determined by the speed of the brightest individuals, but by the average learning speed of the entire organization.

We came to our first conclusion: ***People will tolerate the directives of leadership, but they will ultimately act on their own***. This is a chilling statement for any organization undergoing change. This means that no leader can dictate, sell, or cajole people across the Grand Canyon. They must set the stage for people to *build* a bridge and cross it, to allow people to go on a journey of discovery and draw their own conclusions about the critical issues facing education today. Only when people change their conclusions will they then change their actions.

Our second pivotal conclusion evolved: ***Everyone in the organization must see and understand the big picture***. They must be allowed to understand the whys, not just the day-to-day whats. Have you ever put a puzzle together without first looking at the completed picture on the cover of the box? Virtually impossible! Nevertheless, too often in most organizations, leaders spend weeks reviewing data and input about the realities of their organization so that thy can put together their strategy or vision of the future – then, they tear the vision or strategy up into little bite size chunks and distribute them to various teams and people in the organization and tell them to make it happen. The part they left out is letting everyone else in the organization see the data and information about the realities facing schools today so that they can come to the same conclusion that moving in this direction makes sense.

When we started developing a organizational learning tool called **Root***Map*™ visuals, we asked two basic questions: (1) How do people learn, and (2) how can large numbers of people quickly understand the most complex issues facing our organization? First, in our research we determined that people learn visually. Aristotle said, "The soul never thinks without a picture." Alan Kay of Apple Computers took it one step further: "If a picture is worth a thousand words, a metaphor is worth a thousand pictures."

We have learned that visualization is an accelerant tool. As learners absorb new information, it forms a picture in their minds. This picture emerges only when people can create links between their existing knowledge and new information. Visualizing critical business issues allows individuals, teams, and organizations to think systematically. It also creates focused thinking, allowing everyone to build a shared understanding of the larger systems that determine the effectiveness of their individual actions.

If visualization is the first tenet of **Root***Map*™ visuals, our second is dialogue–specifically, strategic-directed Socratic dialogue. Socrates knew that learning is less about giving the right answers and more about asking the right questions. The great philosopher developed a system of asking his students questions to get to core truths. He avoided presenting his own conclusions; instead, he sought to immerse learners in their own self-exploration and inquiry.

Like Socrates, we believe there are few sustainable right or wrong answers; there are simply better questions, and the better the question, the more people will participate in engaged thinking. Dialogue demands that cherished assumptions be challenged, that long-held beliefs be explored. The **Root***Map*™ tools use strategic-directed dialogue to address critical organizational issues. This may sound like a simple exercise, but it is very hard to master. Most leaders lecture; most teachers preach. True dialogue seeks to minimize the leader/teacher talk and maximize the learner search.

The third tenet of **Root***Map*™ tools is that people learn best in small groups, guided by "questioner" or ***facilitator*** who nurtures a process of discovery. Not necessarily an educational expert or leader, the facilitator encourages understanding through thought-provoking questions and what-if scenarios.

Successful leaders know that their first responsibility is to define the reality of the organization. Therefore, the process of executing major improvements rests on a widespread employee understanding of the competitive, economic, technological, customer/stakeholder, market, and environmental realities that drive your organization.

A person *without* such an understanding may not accept responsibility for the future of the organization. A person *with* this information cannot help but accept responsibility. By appealing to the highest level of thinking in people, leaders ensure the highest level of actions, commitment, and organizational "alignment." Organizational and financial literacy are essential to make people and all community members effective players in this effort and know how to keep score on the results. People must have a basic understanding of how the organization operates and what it takes to win if they are to successfully participate in improving it. The **Root***Map*™ tool presents a method for allowing everyone in your school, your school district and your community to gain this understanding and align their efforts accordingly.

ODL SYSTEM FOR ENGINEERING POSTGRADUATE STUDIES

Jolanta Chec, M.Sc.Eng.*

INTRODUCTION

In the information age, ODL postgraduate studies are one of new forms of Life Long Learning Process (LLL) for working adults (knowledge updating). They enable education independently on time and place. They comply with actual professional needs and requirements.

Training Centre at National Institute of Telecommunications (NIT) in Poland offers, as a continuing education, postgraduate studies for adult engineers such as: multimedia telecommunications systems, management of telecommunications networks, radio-communications systems and also series of courses and workshops in the field of modern telecommunications and informatics. NIT plans to offer ODL postgraduate studies and ODL courses for engineers.

Elaboration of high quality and useful ODL System requires to identify purposeful and functional requirements that comply with students needs, possibilities and expectations. Many analyses, considerations and comparisons concerning existing ODL models, information technology and telecommunications tools, character of studies, economic and pedagogic aspects of ODL should be performed to prepare an appropriate ODL system.

Analysis of existing ODL models (off-campus, near-campus, transparent for lecturers, using knowbots, with distributed cohorts) was presented. Use of presentation, distribution and interaction technologies was considered. Advantages and disadvantages of asynchronous and synchronous telecommunications tools were compared. Economic, pedagogic aspects (Kolb's experiential theory) and also engineering character of postgraduate studies were taken into account in the paper.

ANALYSIS OF ODL MODELS

Distance education programs can be offered (dependently of learners presence at the same time) in asynchronous mode, synchronous mode and hybrid mode. The following models of learning process can be specified according to time and place of learning process:

- synchronous mode: the same time and place (traditional), the same time and different places;
- asynchronous mode: the same place and different times, different times and places

Distance Learning process can take place either off-campus and on-campus. In the case of off-campus learning two models of ODL can be determined:

- very-far-from campus (students have remote access to educational and supporting services);
- near-campus (students can register in the remote manner using computer but other supporting services such as financial services, libraries services, examinations and laboratories are offered on-campus).

In the case of on-campus DL students can participate in traditional lecturers and communicate with other learners and tutor using computer and Internet on campus. Self-pacing is possible in this case. Distributed cohort groups model (small groups of 3-5 persons geographically distributed, working together) is used in Asynchronous Learning Networks (ALNs are used by Sloan ALN Consortium). It is very useful in narrow specialities (for small number of specialists located in different places). Some models of ODL concerning tutors work were developed. Learning process is transparent for lecturers in Stanford Model. Other model uses intelligent agent techniques. Intelligent software agents that automated the repetitive tasks of human facilitators are called knowbots (knowledge robots).

FUNCTIONS OF ODL SYSTEM

Educational system, applied by the educational institution for Distance Learning shall ensure on-line courses and lectures, storage of data concerning (archives) courses, lectures and course participants, marketing of courses, statistics concerning courses and course participants, services for system users.

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Functions of ODL system for engineering postgraduate studies should be specified with regard to different types of users and their privileges:
for students (access to general and learner's information, registration, payments, training, interactions), *for lecturers/tutors* (access to information concerning particular users, updating of didactic material, timetables, interactions: consultations, examinations), *for administration staff* (access to administrative information concerning particular users, updating of administrative information, preparation and service of course certificates). These functions should be accessible through the educational portal.

Educational portal is an interface where each user of education system can find appropriate entry with access to different systems functions (educational, information, administrative).

INFORMATION AND COMMUNICATION TECHNOLOGY FOR ODL

New open and distance forms of education are the result of very quick development of Information and Communication Technology (ICT). Technologies used for creation of ODL systems are of the following types:

- *presentation technologies* enabling presentation of learning material in rich form being friendly to user (using multimedia, graphics, hypermedia, simulations and animations);
- *distribution technologies* enabling delivery of learning material;
- *interactive technologies* enabling human interaction during learning process.

Telecommunications tools are used in open and distance learning for communication between users of ODL system. They are of the following types, according to the requirements, concerning user dependency of time during learning process:

- *asynchronous tools* (communication independent of time);
- *synchronous tools* (communication at the same time).

Asynchronous tools are very good for text based communication and distributing file based information to learners. Synchronous tools are very good for brainstorming and starting of new activities. In the case of asynchronous discussion tutors can answer only once to all learners and can moderate discussion without pressure of time. In the case of synchronous communication tutors more easily keep the thread of a discussion than in asynchronous communication. Asynchronous tools ensure self-paced learning, reflected feedback, collaboration with other learners independently on time. Synchronous tools ensure individual and group work, immediate feedback, spontaneity and immediacy.

Practical experience concerning use of ODL courses (e.g. gained as a learner in ODL courses via Internet) is very useful to formulate appropriate solutions for ODL systems. It is very important to select appropriate technology and tools for preparation of good and high quality ODL lecturers that facilitate learning process (learning is more effective and more pleasant). ODL didactic material should ensure very high degree of interaction, very quick search of information, possibility of self-learning and self-evaluation and also well-organized references (e.g. to electronic libraries) enabling deeper knowledge of material. It should use rich presentation technologies (multimedia and simulation programs) ensuring large capacity. It can be accessible on CD ROM and in the Internet. Appropriate telecommunications tools (asynchronous and synchronous) should be chosen according to communications needs and requests of students and lecturers enabling interaction (asynchronous or synchronous) between lecturer/tutor and students and also between students.

DIFFERENT ASPECTS OF ODL FOR ENGINEERS

Pedagogical and economic aspects of ODL system for engineers are presented in this chapter. Good understanding of learning process is very important for designing and implementation of appropriate and useful learning environments. According to Kolb's experiential learning theory: learning is a process whereby knowledge is created through the transformations of experiences. Learning process is facilitated by the creation of appropriate learning environment where learners can gain experiences. Learners are in direct contact with the reality being studied in experiential learning. Human brain contains two hemispheres: left hemisphere represents abstract symbols and the right hemisphere represents reality. The learning process is not identical for all human beings so different learning styles can be distinguished: accommodation, divergence, assimilation, convergence. Two perpendicular learning dimensions mutually independent (prehension dimension: from concrete experience to abstract conceptualization and transformation dimension: from active experimentation to reflective observation) determine four learning modes: active experimentation, abstract conceptualization, reflective observation, concrete experience and four knowledge types: convergent, assimilative, divergent, accommodative. Learning styles are determined by learning modes. An appropriate learning environment (that supports learning mode) is needful for effective learning. Learning environments can be of the following types: behaviourally complex, symbolically complex, perceptually complex, affectively complex.

In engineering education, the laboratory experience and team-related design experience are of great value. In ODL system for engineers it can be realized by: Distance Laboratory and Distance Designing. The concept of Distance Laboratory contains the following forms: simulation of device functions or phenomenon by the mathematical model of an experiment, real distance experiment (computer controls the measurement system by the use of Internet), home laboratory (by the use of home computer and laboratory kit). Distance Designing is realized by group work with the following capabilities: asynchronous interactivity, synchronous group work (by the use of white boards), individual work space. It often requires use of expensive complex software (such software can be installed on a special server and accessible for remote users).

Education costs can be of two types: faculty (lecturers salary) and non-faculty (salary of administration and technical staff, costs of physical campus and equipment). Cost of learning in asynchronous mode depends on the kind of learning: self-study, study with instructor support, hybrid of these two previous forms. Costs can be decreased by the increase of number of students participating in courses. Education activity is expensive thus total costs should be reduced as much as possible ensuring high quality of teaching.

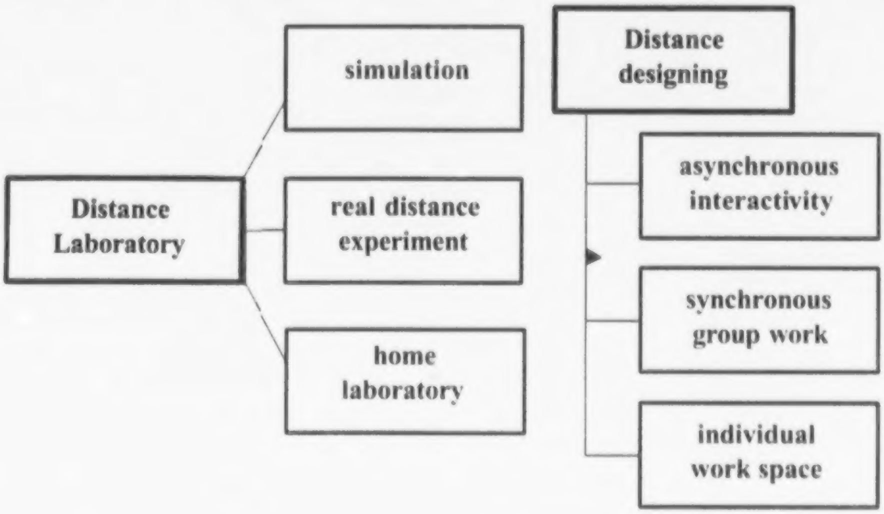

Fig. 1. Distance laboratory and distance designing in engineering studies

CONCLUSION

The paper is based on my analysis of materials accessible in Internet (especially Journal of ALN and ALN Magazine: 1997, 1998, 1999, 2000), conference proceedings concerning education, proceedings of professional tools for education (ready products), my practical experience gained as a learner in ODL courses via Internet concerning quality assurance in ODL and ODL theory (FACILE course).

Asynchronous mode of education (anytime, anywhere) with modern and cheap synchronous mechanisms is chosen as the best solution for postgraduate studies, to be offered by National Institute of Telecommunications in Poland, to comply with needs, possibilities and requests of engineers (working adults).

PINNACLES AND PITFALLS OF WEB-BASED COURSES

Bonnie H. Armstrong*

INTRODUCTION

The goal of educators is to provide the pinnacle of education for their learners, i.e. meaningful and satisfying learning experiences that truly prepare learners for further academic work or for accomplishment in professional life. But the means of achieving such success in web-based distance learning is not yet well defined. Using a case study, this paper describes the use of three critical elements to identify four common pitfalls in a web-based course and the development of strategies for avoiding or minimizing these pitfalls.

ANALYSIS OF ONLEARNING EXPERIENCE

A graduate course called Introduction to Instructional Systems was chosen as the unit of analysis. All eighteen students in the course had taken at least one online course during the previous year. The instructor had taught using video-conferencing and onsite courses with some web-supplements, but this was her first experience teaching completely online. The course itself had been taught online once in the past year by a different instructor and to a smaller student group. During the semester the instructor recorded a log of problems and solutions. At the conclusion of the course, a framework guided by Powers and Guan's (2000) three critical elements that must be addressed in online courses was used to organize the data. These elements are the abilities of learners to 1) become involved with course information, 2) manage course information, and 3) process course information. Using this perspective, three pitfalls emerged from the data that seem likely to occur in online learning unless strategies are employed to avoid or minimize them. In addition, a fourth pitfall was identified that related to how much effort students put into overcoming the other three pitfalls.

PITFALLS AND STRATEGIES FOR AVOIDING OR MINIMIZING

Pitfall #1. The first pitfall concerns the learner's ability to become involved with course information. In the course studied, online students were most confused during the first two weeks of the semester about what to do, how to do it, and when to do it. These confusions went beyond technical problems to include understanding the goals and objectives of the course, schedule of readings, activities, and assignments, and assessment procedures. Onsite learners sitting in a classroom may also experience confusion, but onsite instructors are able to read nonverbal behaviors and to respond immediately to uncertainty by going over course materials and procedures. In addition, onsite students may feel more comfortable initiating questions, at least in the beginning of a course. The distance learner is often reluctant to raise issues of confusion, perhaps believing he or she is the only one experiencing such distress.

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In response to these initial confusions, the online instructor guided students to sections of the syllabus that answered specific questions, and inserted calendar dates into the schedule of weeks. In addition to a complete, clearly formatted syllabus, the instructor developed a "course procedures document." This document helped learners figure out what to expect in the online environment and gave directions for accomplishing specific web-based activities. It included such topics as when the discussion boards would be opened and closed each week, types and lengths of discussion board postings, how to submit assignments, netiquette, e-mail uses and procedures, etc. Further, the instructor added a discussion forum called the Online Office for students to post questions of general interest. Along with the instructor, other students were also encouraged to help answer the questions if they could. The instructor also responded to questions there. Another related strategy that could be used is a FAQ section. Both the online office and the FAQ sections encourage students to make public their confusions and receive answers to help them move forward in the course. Both procedural and academic concerns can be addressed in such sections.

Another strategy the instructor employed for helping students become involved with course information was by moving (bumping) files in the course documents, assignments, and discussion forums to the last position in the list as each week's work was completed. This enabled students to easily find the current documents or boards. And finally, the instructor used the announcement board as necessary to alert students to changes in schedule, activities, assignments, or documents. E-mail was reserved for individual messages, and this helped the instructor also manage the amount of e-mail response she needed to make.

Pitfall #2. The second pitfall relates to the learners ability to manage course information. It is easy for online learners to fall behind in course participation. They may be lurking on the discussion boards, but the instructor has no way to ascertain their presence, unlike the onsite instructor who can see who is attending class, even if students don't contribute to the discussion. In the course studied, the instructor sent individual e-mails when learners failed to participate on a discussion board in the time-frame provided or did not submit an assignment. This inquiry was positively stated as one of concern for the student and included a request to let the instructor know if there was a problem and if she could provide help in some way. In every instance the students replied quickly and positively to the instructor, participating or submitting work even though late and quickly catching up with the rest of the class.

Another strategy for helping students manage information was developed in reaction to student concerns about workload distribution. Since the course had only been taught once to six students, the instructor reviewed and adjusted workload requirements and restructured some activities. Most courses haven't been taught online long enough to know exactly how much content, activities, and assignments are both necessary and reasonable.

Pitfall #3. The third pitfall is related to the learner's ability to process course information. Online learners seem to experience more anxiety, at least initially, about meeting instructor expectations and in performing at the level of other students. Learners lack nonverbal and verbal clues that occur in an onsite classroom, and so are even more interested in instructor feedback and other students' actions and reactions to assignments and during activities. As the semester progressed in the course under analysis, students frequently expressed appreciation to the instructor for her prompt feedback on assignments and her feedback on discussion board activities. They also mentioned often that they enjoyed the group assignments and the chance to get to know fellow class-mates more directly. Telephone contact also helped to alleviate activity, with six students calling the instructor either during telephone office hours or by special appointment.

Pitfall #4. The fourth pitfall underlies the motivation of learners to cope with the three critical elements discussed above. This pitfall concerns the isolation that online learners can easily develop. The need for a sense of community in online learning has been identified and discussed at length by Boettcher and Conrad (1999). According to them, learners who do not feel part of the learning community may become lurkers at best or drop outs at worst. In the course studied, the instructor encouraged students to post biographies and pictures and facilitated learning activities during the first two weeks that required students to post discussion board entries describing their work settings and professional goals. In addition, the instructor opened an online "Student Lounge" where students could share information related and unrelated to the course and just "hang out." Also, the instructor was careful to personalize all e-mail messages and postings to specific students on the discussion boards. Finally, the instructor took full advantage of the course design to pair students or form small groups for the majority of the activities after the first two weeks.

In conclusion, Powers and Guan's critical elements proved useful in identifying specific pitfalls in online courses that may keep learners from reaching the pinnacle of a successful educational experience. Strategies for avoiding or minimizing these pitfalls were created based on course design features, distance learning literature, and the instructor's own teaching experiences with other forms of distance learning.

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STRATEGIES TO INCORPORATE ACTIVE LEARNING INTO ONLINE TEACHING

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What is active learning? Bonwell and Eison describe active learning strategies as those that involve "students in doing things and (have the students) think about the things they are doing" (Bonwell and Eison, 1991, p. iii). Active learning is a key element in the learning process and most adult learning models view interaction (active learning) as a crucial component (Mantyla, 1999, p. 19). In an effective learning environment that incorporates active learning strategies, "greater emphasis is placed on students exploration of their own meaning, attitudes, and values" (Bonwell and Eison, 1992; Mantyla, 1999, p.19). However, a mistaken view many educators have is that learning is an active process and as such, all learning is active, even the most commonly used form of instruction, the passive lecture. In an active learning environment, "less emphasis is placed on transmitting information (teacher-centered) and more on developing students' skills (student-centered)" (Bonwell and Eison, 1991, p.2).

Active learning is not only an effective instructional strategy in the traditional learning environment, but also, it is effective in an online environment. Instructors/designers must continue to design activities that support learning objectives, but structure them to work online, outside of the traditional classroom environment where active learning techniques are heavily dependent upon face-to-face interaction (e.g., discussion, group work, role-play). For example, consideration must be given to the fact that instructor and learners may not be in the same place at the same time (asynchronous) to interact whereby relying on instructional technologies as part of the interactive learning process. However, the online environment can sometimes be a more favorable learning environment for students in that all have equal opportunity to participate, share thoughts and develop ideas over periods of time. Students' expressions are not limited by the class size, which are called upon, or time allotted to participate (Harasim, et al, 1997).

Why active learning? Succinctly stated, "active participation strengthens learning" regardless of environment (Harasim, et al, 1997, p. 29). Active learning requires "intellectual effort, encouraging higher-order thinking (analysis, synthesis, evaluation)" and provides a means for the learner to assimilate, apply, and retain learning (Bonwell and Eison, 1991; Harasim, et al, 1997). Strategies promoting active learning are superior to passive learning (lectures) in promoting the development of student's skills in thinking and writing (Bonwell and Eison, 1991, iii). Active learning accommodates a variety of learning styles, promotes student achievement, enhances learner motivation, changes student attitudes, and basically, causes learners to learn more (Astin, 1985). Bonwell and Eison contend that from a preference perspective, students (generally) prefer strategies promoting active learning to traditional lectures and other passive methodologies (1991).

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Active learning empowers students to take primary responsibility for their education (student-centered) (Warren, 1996), although requiring faculty to relinquish some control to the student to encourage their learning path (Gibson, 1998, p.79).

What are appropriate active learning strategies for an online environment? Designing instructional strategies (traditional or online) to engage learners is challenging. Traditional strategies must be adapted and/or new strategies developed for the online learning environment. Widely used effective active learning strategies such as group work or role-play can even be successfully adapted for an online environment. When developing active learning strategies for an online environment, the instructor/designer should first consider sound design practices including, but not limited to: assessing the learners, knowing the context and environment in which learners will be operating, knowing instructional tools and techniques for delivery, developing supporting strategies in the form of directions and resources, incorporating assessment of learning outcomes and course design, and designing with active engagement in mind (Mantyla, 1999). Starting from a basic instructional design model and continuing good teaching practices are important because according to Moore and Kearsley, "active learning is probably not going to happen in an online environment unless the interaction is deliberately planned and the instructor encourages it" (1999).

Components of good active learning activities are the same, whether presented in traditional or in online environments. Activities should 1) have a definite beginning and ending; 2) have a clear purpose or objective; 3) contain complete and understandable directions; 4) have a feedback mechanism; and 5) and include a description of the technology or tool being used in the exercise (Mantyla, 1999, p.83).

When using traditional active learning strategies, instructors/designers will want to consider the following: Can learners complete the activity independently? Will they need specific guidance before or during the activity? Will visuals or other materials be needed? Will they need to collaborate with other learners? How do the learners ask questions? Will there be formative or summative evaluation? What tools will be available to support the activity, including technology, resources, and examples? Should different strategies and tools that provide multiple ways of experiencing learning? (Mantyla, 1999, p. 65) There are many examples of active learning strategies that can be adapted for the on-line "classroom" including, but not limited to:

- Assessment - tests and quizzes that provide immediate feedback
- Writings (reflective journals, summaries, essays, critiques)
- Demonstrations with questioning (video clips)
- Games & Simulations
- Community building
- Readings, case studies
- Projects- group or individual
- Study/support groups
- Problem solving
- Role-play
- Discussions (virtual chat, bulletin board)
- Experiential Learning: Internships/Preceptorships/ Externships
- Visual-based instruction (streamed video or CD)
- Online Presentations
- Directed research

In summary, active learning strategies are effective in engaging learners and assisting them in creating their own learning experiences. Models and tested strategies can help instructors/designers (novice and experienced) develop new activities to engage learners in the online environment. It is the instructor's (designer's) responsibility to develop an environment that supports active learning strategies and methods to enhance learning and support the learning objectives. There are many resources available to support developing effective online learning environments through active learning strategies. For an annotated list and a copy of this presentation, visit http://www.cas.usf.edu/lis/presentation

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FACULTY GOING THE DISTANCE: MOTIVATIONS, INCENTIVES, AND SATISFACTION IN FLORIDA COMMUNITY COLLEGES

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While the practice of distance learning has been a part of higher education for more than a century, today's technology has placed this instructional method in the forefront of discussion on teaching and learning in higher education. Recent technological advances have resulted in a movement in higher education toward increasing use of distance learning technologies. A December 1999 report by the National Center for Education Statistics (NCES) stated that 65% of the public two-year institutions in the NCES study reported offering distance learning courses and an additional 20% are planning to begin offering these types of classes (NCES, 1999). The inevitable result of this increase in distance learning courses will be an increased number of faculty engaged in distance learning efforts.

A number of authors have taken on the task of investigating how the responsibilities of faculty translate into the distance learning paradigm. There have been investigations of faculty attitudes toward distance learning (Clark, 1993; Taylor & White, 1991) and explorations of faculty rewards, motivations, and incentives for involvement in distance learning (Miller & Husmann, 1997; Wolcott, 1997). One of the themes in the literature on faculty participation in distance education is a discussion of motivating or enticing faculty participation in distance learning. Much of this literature is an extension of current concepts of faculty job satisfaction. A review of the literature on job satisfaction among community college faculty has shown consistently that interaction with students is an important source of satisfaction for this group of faculty. A recurring dissatisfier is the time it takes to adequately prepare for classes, which has been shown in several studies to be a source of concern (Hutton & Jobe, 1985; Milosheff, 1990).

The purpose of the present study was to investigate faculty perceptions of distance learning courses, their training in and types of compensation for participation in distance learning, and factors influencing their satisfaction in these areas. The findings presented are part of a statewide program review conducted by the Florida State Board of Community Colleges. Eighteen colleges participated in the study. Of the 233 faculty members engaged in distance learning, as defined by this study, usable responses were received from 153 (66% response rate). Responses were captured using a 43 item questionnaire designed to gather information about of number of issues relating to the faculty experience in distance learning.

RESULTS

The faculty who participated in the study reported teaching 155 different courses in a variety of disciplines. Forty-seven percent of the respondents were female, 53% male; the large majority (85%) were full-time faculty. The years of

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community college experience ranged from 1 to 35 years (mean=14 years; mode=10 years). Most faculty (65%) reported teaching only one distance learning course. Reported class size ranged from 1 to 85 students. The mean class size for those teaching only one class was 23 students; mode was 20 students.

Faculty in the study were asked several questions regarding the efforts taken to prepare them for teaching a distance learning course. The data were analyzed to investigate whether the receipt of training or the perception of the adequacy of the training had any effect on the faculty's overall perception of the distance learning experience. Chi-square values were computed and four significant relationships were found to influence the overall rating of the teaching experience in distance learning: adequacy of general training in the use and application of distance learning technology ($x^2 = 8$, $p = .046$); adequacy of training in curricula development for distance learning ($x^2 = 9.35$; $p = .025$); adequacy of training in distance learning teaching methods ($x^2 = 13.15$, $p = .004$); and effectiveness of training in distance learning teaching methods ($x^2 = 13.20$, $p = .001$). This finding suggests that training designed to prepare faculty for various aspects of distance learning makes for a more satisfying experience for faculty involved in distance learning.

Faculty were also surveyed regarding incentives and motivations for distance learning participation. Computer equipment was the incentive most frequently reported and the only incentive significantly correlated with willingness to teach another distance learning course ($r = .169$, $p < .05$). Four types of motivations to *become* involved in distance learning correlated significantly ($p < .01$) with the overall experience: ability to reach a new audience ($r = .378$), ability to develop new ideas ($r = .351$), personal interest in technology ($r = .360$), and intellectual challenge ($r = .328$). Similarly four types of motivations to *continue* involvement in distance learning correlated significantly ($p < .01$) with the overall experience: ability to reach a new audience ($r = .357$), ability to develop new ideas ($r = .393$), personal interest in technology ($r = .328$), and intellectual challenge ($r = .469$). These same motivations also correlated significantly with faculty willingness to recommend distance learning to their colleagues ($r = .275$, $r = .392$, $r = .221$, $r = .361$, respectively). Personal interest in technology was the only motivator to correlate significantly with willingness to teach another distance learning course ($r = .251$, $p < .01$).

While the large proportion (84%) of the faculty indicated that distance learning course development took longer than development of conventional courses, and 67.9% indicated that distance learning class preparation took longer than class preparation for conventional courses, these sentiments did not correlate significantly with overall satisfaction with the distance learning experience. However a significant correlation was found in the relationship between the agreement that distance learning courses are more time consuming to develop than traditional courses and willingness to teach another distance learning course ($r = .177$, $p < .05$).

Most of the faculty in the study found the distance learning experience to be positive, would teach another distance learning course, and would recommend teaching a distance learning course to their colleagues. As might be expected finding the quality of distance learning courses to be at least equivalent to the quality of traditional courses correlated significantly with having an overall positive experience (r = .393, p < .01), recommending to their colleagues teaching via distance learning (r = .403, p < .01), and willingness to teach another distance learning course (r = .284, p < .01). Additional correlations indicated that female faculty were more positive about the overall distance learning experience than their male colleagues (r = .249, p < .01), as were part-time faculty (r = .220, p < .05), and female faculty were more inclined to recommend to their colleagues teaching a distance learning class (r = .254, p < .01).

CONCLUSIONS

Several themes emerged from a review of the data. Results of this study indicate that training influences faculty perception of the distance learning experience. Those faculty who receive training that they consider to be adequate or effective reported more satisfaction with the distance learning experience. Institutions that want to offer distance learning courses should make efforts to provide sufficient training for faculty who will teach those courses. For the faculty in this study, incentives were not especially effective in influencing their perception of or willingness to engage in distance learning efforts. Intrinsic motivations were a stronger influence on faculty satisfaction and continuing interest in and support of distance learning initiatives. As they plan for and develop distance learning programs, institutions should consider ways to enhance faculty participation and commitment to distance learning efforts by exploring ways to tap into influences uncovered in this study.

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CONCEPT MAP-BASED VS. WEB PAGE-BASED INTERFACES IN SEARCH AND BROWSING

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INTRODUCTION

Searching information quickly and accurately in hypermedia settings is important in educational and research settings. Interfaces that provide structure in a form that is meaningful to the user should make it easier for the user to find information.

Research in our laboratory (Carnot, Dunn, Cañas, Gram & Arguea, 2000) suggests that concept maps (Novak & Gowin, 1984) based on an expert's knowledge model of a domain can provide a useful navigation device for hypermedia. Concept maps depict the concepts and relationships in a domain in a graph that is arranged in a hierarchical way, however, concept maps can depict non-hierarchical relationships through the use of crosslinks (Novak & Gowin, 1984). Using an expert's concept map as a browser may provide an inherent organizational structure that is more useful to the learner for navigating information in a hypermedia environment than more typically used interfaces such as web pages and linked text (Cañas, Ford & Coffey, 1994). When used in this way, the concept maps serve as an advance organizer for multimedia materials (Willerman & MacHarg, 1991).

The concept map interface in the current experiment was constructed using the CMapTools software package developed by the Institute for Human and Machine Cognition (available at http://cmap.coginst.uwf.edu). The patented software allows a designer to build an interrelated set of concept maps, and to attach multimedia resources to concepts. Thus a multimedia learning environment can be created which depicts an expert's knowledge model of a domain, with concept maps organizing and providing access to and resources.

In this research, an interface based on concept maps is compared to more typically used interfaces of web pages and linked text. Web pages are the most typically used interface, and provide access to materials that is primarily serial and page-based. Concept maps differ from other interfaces because they provide a graphical organizational structure of concepts that may enhance access even when the order of search is non-optimal (as in browsing). In the current research, linked text interfaces provide a non-graphical depiction of the relational information in the concept maps.

Previous research has indicated that individual differences in meaningful learning may be related to effective use of concept map interfaces (Carnot, Dunn, Cañas, Gram & Arguea, 2000). Meaningful learners are actively involved in learning, they look for and organize information around main ideas, they relate new information to previous information, and they look for personal meaning in learning (Novak, 1998). Our previous research has used the Learning Approach Questionnaire (LAQ) (Donn, 1990) to determine a person's meaningful learning style. Concept maps have benefits for all users, but are most beneficial for individuals identified as having a meaningful learning style. For this experiment we hypothesized that meaningful learners may be less affected by random order of search questions than rote learners when using the concept map interface.

Thus, the present experiment was designed (1) to compare search performance using the concept map interface with using a web page or a linked text interface, (2) to determine the effects of question order on search performance and (3) to determine the effects of learning style (meaningful vs. rote) on the effective use of the interfaces.

PROCEDURE AND DESIGN

Sixty-two undergraduate psychology students received extra credit for their participation. All completed the LAQ and were assigned to meaningful or rote learning style groups based on a median split of the scores. Participants were then were randomly assigned to interface and search order conditions, and were asked to answer as many search questions in their assigned interface and question order condition as they could in a 50 minute time period. They were asked to answer the questions in order without skipping questions. The primary dependent measure was percent of search questions correctly answered. The independent variables were interface, learning style, search question order, and meaning level (described below), resulting in a 3 (Interface) by 2 (Learning Style) by 2 (Search Question Order) by 3 (Meaning Level) mixed design, with Meaning Level as a within subjects variable. Learning style was not manipulated but determined by score on the LAQ.

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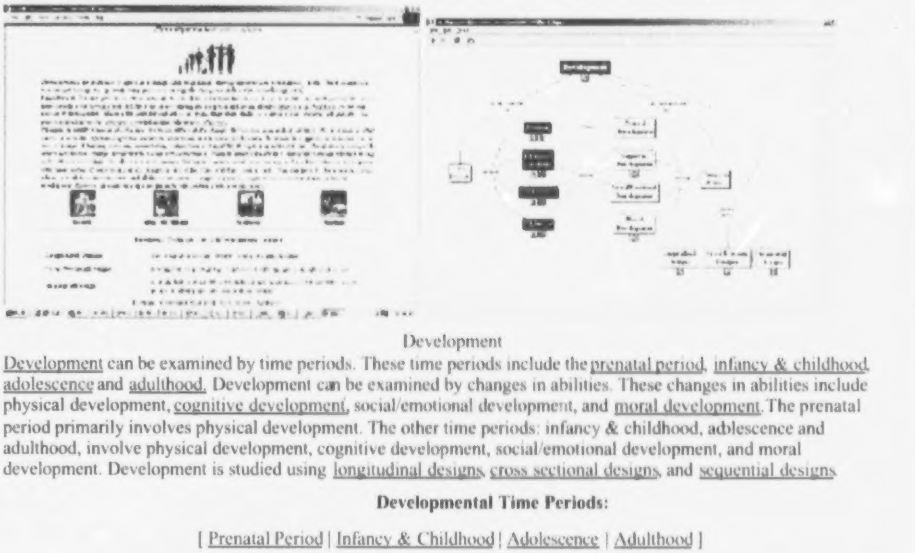
The three interfaces (concept map, web page and linked text, shown in Figure 1) were developed based on an introductory chapter concerning developmental psychology. Participants had no prior formal class work on this topic. The interfaces were used to organize supporting resources.

The concept map and linked text interfaces were identical in terms of wording and linking structure. Web pages were as close as possible to the other two in content and structure, but were designed to be more like typical "good" web pages, and appeared more filled in and textbook-like than the linked text interface.

Figure 1: Examples of Top Level Web Page, Concept Map, and Linked Text Interfaces



Development

Development can be examined by time periods. These time periods include the prenatal period, infancy & childhood, adolescence and adulthood. Development can be examined by changes in abilities. These changes in abilities include physical development, cognitive development, social/emotional development, and moral development. The prenatal period primarily involves physical development. The other time periods: infancy & childhood, adolescence and adulthood, involve physical development, cognitive development, social/emotional development, and moral development. Development is studied using longitudinal designs, cross sectional designs, and sequential designs.

Developmental Time Periods:

[Prenatal Period | Infancy & Childhood | Adolescence | Adulthood]

Concept maps and other interfaces were constructed to cover information at different meaning levels – gist or main idea, supporting information, and detail levels. These meaning levels were addressed in the search questions.

Two orders of 75 search questions were developed. Ordered questions followed the logical order in which information was covered in the three interfaces, and is considered an "optimal order." In the random question, or "non-optimal" order, a single random order of questions was developed.

RESULTS AND CONCLUSIONS

The results presented here are based on percent correct of all search questions. Participants were classified into low and high meaningful learners based on Learning Approach Questionnaire (Donn, 1990). A four-way mixed ANOVA was performed on the percent correct data.

Concept map users ($M = 38.98$, $SD = 13.93$) had greater mean search scores [$F(2,50) = 6.02$, $p < .05$] than web page users ($M = 33.48$, $SD = 18.26$) and linked text users ($M = 33.07$, $SD = 15.60$). Participants who answered questions in the order of presentation in a given interface ($M = 45.62$, $SD = 12.52$) performed better [$F(1, 50) = 116.06$, $p < .001$] than those who answered them in

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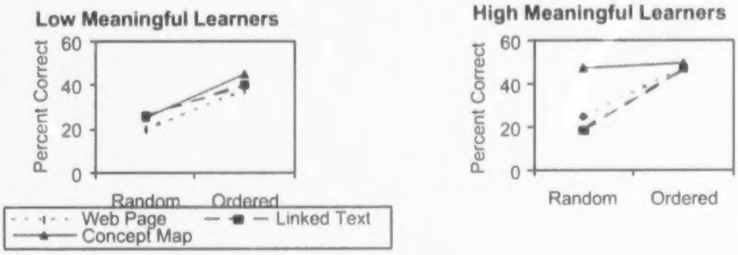
random order (M = 24.92, SD = 11.46) and meaningful learners (M = 40.16, SD = 16.91) performed better [F (1,50) = 4.89, $p < .05$] than rote learners (M = 32.01, SD = 14.05). The effect of meaning level was also significant [F (2,100) = 51.30, = < .001], indicating that gist level questions were answered correctly more often than supporting or detail level questions (Means are 57.30, 27.44, and 39.04 for gist, supporting and detail level questions, respectively).

The two-way interaction between meaning level and question order was significant [F (2,100) = 70.97, $p < .001$], indicating a greater change across meaning level for ordered questions than for random questions. This interaction is most likely due to the fact that gist level questions were primarily answered first in the ordered question condition.

The three-way interaction (Figure 2) between learning style, interface, and question order was significant [F (2,50) = 3.35, $p < .05$]. If meaningful learners used the concept map interface, they had superior search performance regardless of search order. Non-meaningful learners' performance was adversely affected by random order questions regardless of interface. In fact, with the other interfaces so was the meaningful learner's search performance.

Figure 2: Percent Correct for Low and High Meaningful Learners as a Function of Interface and Search Question Order



These results indicate that concept maps can successfully be used as organizing structures for knowledge models and multimedia. They may be particularly beneficial when learners can be guided through the material in a logical way (i.e. through LEO, Coffey & Cañas, 2000). If users can be encouraged to be meaningful learners, optimal ordering of materials may not be as critical. Providing an optimal order may also be more important for users with little prior knowledge.

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LEARNING WITHOUT TEACHING,
Use of ICT-based Models in Teacher Training

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Over the last eight years, we have through both European an national projects, evolved models for integration of external and on-campus courses. From only having on-campus courses with «traditional» teaching, we have gradually published our courses on Internet, and offered them as Open and Distance Learning (ODL) courses. This evaluation has brought focus on how to teach, both on Internet and in the classroom. Important questions are: What is different between meeting the student in the classroom and on Internet? How do teachers and students interact with each other in the classroom, and how is this interaction different on Internet? How do we make the best and most effective interaction between students and teachers?

FROM TEACHING TO GUIDING

It is obvious that interaction with external students will differ from interaction with on-campus students. While on-campus students are able to use a more direct interaction with the teacher and fellow students, the interaction with external students are mostly based on the use of electronic tools.

To evolve our models of teaching, we have asked: When external courses do not have any teaching in the traditional sense of the word, but are based on guiding of the students, how can teaching in the classroom on internal courses be an important and fundamental factor? The answer seems to be that we do not have to make the teaching in the classroom the only difference between external- and internal courses. We use the classroom to stimulate internal students to work with the material in the same way as external students.

Based on our experiences we find that interaction with external students is very accurate in the sense that the students ask/interact according to the content of the course or related to assignments. The students are well prepared for the guiding and interaction with the teacher. This context related guiding is more effective than traditional teaching, where the content is very often new to the students. By cutting the traditional teaching in the classroom, and using the time for guiding, we force the students to work with the content before they meet in the classroom. They have to identify problems, form questions, not just be passive listeners to a lecture of new material. We force on-campus students to work much more like external students. Very often lectures are organised as a delivery of new information, and a stimulus to work with the material **after** the lecture.

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In our model we shift this focus, and force the students to work with the material **before** the teaching and guiding in the classroom or on Internet. The students' roles as listeners are changed to roles as workers who are able to prepare and influence on their own learning. We find the face to face interaction very important. The reduction of teaching in the classroom is done to make time available for guiding, individually or in groups, not to reduce time spent on communication between student and teacher. The fundamental in our new model is that the students to a much grater extent decide the content of the interaction between teacher and student.

LEARNING WITHOUT TEACHING

Learning is no direct consequence of teaching. Based on this assumption, we have focused on what the students need help to understand, not on the delivery of a number of predefined lectures. To use the time efficiently we do not want the students to spend their time listening to information, which they just as well can read or work with by themselves, or that they do not find to be a problem to understand. Input from the teacher should be given after the students have reflected on the content.

The organisation of our courses is based on an complete integration of external and on-campus students, and in our model we have developed identical courses for these two categories of students. The physical location of the students should not influence the organisation of the courses.

Important factors in our model are:

- There is no «traditional» teaching in the classroom, but the students can «order» lectures from the teacher according to their own wishes. The burden of deciding the main points of the lectures is handed over to the students. In this way they influence the teaching. This opportunity to get individualised teaching or guiding can be made through Internet for both external and on-campus students, and in the classroom for internal students. This is a new way of defining teaching, where knowledge or information is not given to the students, but obtained from the teacher, - teaching on demand.
- The classroom is redefined as an area for interaction. While the external students only use the Internet to interact with the teacher, the on-campus students also use the classroom.
- All questions or «ordering» of lectures, are to be published in an open conferencing system, where all students that are interested can participate. The result of the lectures shall also be published on Internet, in order to give all the students the same opportunity to participate in both ordering lectures, and getting information from them. In this model the students are able to decide where to participate, and identify what is necessary and interesting for their own learning. We make a more time efficient system for the students. They judge by themselves what they want or need.
- The teacher's role will be to prepare most of the content of the course. This is done by making references to books, URLs, multimedia sequences and other recourses. In our courses the teachers also have to develop much of the course material by themselves. In

this way the teachers make the content available, and the students select what themes to work with individually, in cooperation with other students or the teacher, in the classroom or on Internet. We also see that the teachers need to have knowledge in related areas, because the students often like to have information on themes that are related to the content of the course. The teachers must at relatively short notice be able to give (short) lectures on wanted themes. The lectures may not always be very long and well prepared over a long time, but shorter and more directly based on student related problems and assignments.
- It is also important that the teachers give assignments to the students to stimulate the work. This can be both big defined assignments, or small inspirations to more individually based creative work.

To make a complete integration of external and on-campus students, and to force the students to participate in the course, we have used an e-learning platform. This platform allows teachers and students to publish their material, and interact with each other. We have used the tool ClassFronter (http://fronter.com), a tool with both public and private rooms. ClassFronter contains tools for cooperation, in addition to traditional tools like news, e-mail and chat. The integration of all tools and recourses is here important to make a complete learning environment.

FURTHER DEVELOPMENT

Our courses still have a relative strictly defined curriculum. The interaction and participation of the students are according to this curriculum. To make the students even more important actors in the courses, we plan to let them define and develop more of the content in the courses. We shall not present to the students **what to learn**, but rather **what to solve**. This can be done by giving big assignments, where the students within defined limits can decide how to work with the content. Through identical courses we can get many different points of view to work with the material. The teacher's role is to be a resource that students can use according to individually defined work.

SUMMARY

Our main goal is to base learning on the students' own work, not lecturing. We find the students' participation in the study to be fundamental to the learning, both according to defining the content of the lectures and guiding related to the students own work and assignments. The individual needs for guiding is the most important argument for not using traditional predefined lectures.

USING ELECTRONIC MEANS TO ENHANCE DISCOURSE, TO ENGAGE LEARNERS, AND TO BUILD COMMUNITY IN AN INTEGRATED METHODS COURSE FOR ELEMENTARY PRESERVICE TEACHERS

Dr. Lynae Sakshaug

INTRODUCTION

Rogers and Dunn (2000) studied how preservice teachers (PSTs) constructed their own personal practice theories for teaching and learning based on a range of contexts that they were involved in. PSTs drew much more heavily on prior experience than on what they learned in methods courses in order to create their theories. Open communication increased the use of methods content in forming personal practice theories. Benson & Meyer (2000) described how the use of technology enhanced collaboration between PSTs and their professors. They concluded that discussions provided PSTs with a supportive environment to air thoughts about teaching; discussions helped develop community; focus questions coincided with concerns and issues; and discussions fostered evaluation.

Using technology can create new learning environments that allow for construction of understanding. (Salomon,1998; Connell, 1998). Baker (1994) found that there were behaviors that professors used which increased interaction via technology. Carlson (2000) described a model that infused technology, that minimized impositions and that allowed for maximum student construction.

METHODOLOGY

During the spring semester of 2000, a study began in which two professors team-teaching a block methods course began to explore how using electronic media would enhance discourse and engage students in further construction of understanding related to pedagogy in the 6-credit-hour course, the first of two required courses taught to a cohort of 45 K – 6 PSTs. The course was scheduled for two 3.75 blocks of time per week. During that time students explored concepts related to learning theories, diversity, inclusion, lesson planning, building classroom communities, and teaching with technology. Students also had a field experience that placed them in a K-6 classroom for approximately 13 of the class meeting times.

The electronic media used to engage students in further discussion in the course were e-journals and a listserv. The purpose of the e-journal was to link the field experience more closely with the course by having each student engage in weekly conversation with one of the two professors, referred to as the student's mentor. Discussion via the weekly journal entries was intended to allow for more regular and ongoing interaction about field experiences. Typically in this course students write four reflections over the course of the semester which focused on various aspects of the placement experience. Using e-journals, students would write each week, within two or three days of being in the field. The journal entry would be e-mailed to the mentor, who would respond within 2-3 days with comments or questions. Students were provided with prompts if they needed them. The prompts were, "I took part in…; The student I'm observing…; I was surprised…; I'm wondering…; Other things…".

The mentor's intent with the e-journal was to engage students in a one-on-one discussion about field experiences, to strengthen links to the methods class, and to encourage students to reflect further on their personal theories of learning and teaching. Students had approximately thirteen journal entries, although some students chose to be in the field more often, and of those students, some reflected in their e-journal after the other days that they were in the classroom.

The purpose of the listserv was to communicate with the entire class without the necessity of same-time, same-place interaction. Use of the listserv was established at the beginning of the semester for students to subscribe to and was immediately used to pose questions for and by students that furthered discussion and reflection about a range of topics, from class and from the field

RESULTS

During the semester there were approximately 1755 interactions by students or mentors via e-journals for the group of 45 students. During other semesters, students would turn in 4 write-ups about their field experience. If the faculty member responded, that would yield approximately 360 paper interactions.

Both students and faculty accessed the listserv over the course of the semester in order to raise points or ask questions. There were approximately 1100 interactions via the listserv during the semester. Of those 1100, 202 were generated around questions posed for discussion by faculty or by students. Questions were about topics related to the field experience or to the class. Of those topics, nine were generated from students' e-journals. The topics discussed were: PSTs' prior theories about schools and children; reactions to lessons and resources; learning children's names and building community; why children become engaged in lessons; why cooperative learning is successful; motivating unmotivated children; re-engaging children in the learning process; a sexual abuse case; children reacting to an ineffective substitute.

DISCUSSION

During the semester in which e-journals were used, there were almost five times as many interactions between PSTs and faculty about the field experience as compared to other semesters. Further, there were another 152 correspondences exchanged from questions which were first posed in e-journals and then transferred to the listserv for discussion. PSTs described e-journals as a way to receive feedback about what was happening in the field and to make connections back to the methods class. They also discussed the power of the journals in helping them make sense for themselves about what they were experiencing in the field. Professors saw several benefits of the use of e-journals. Included were more frequent opportunities to connect with PSTs about their field experiences, the ability to respond quickly with questions and comments prior to the PST's next day in the field, opportunities to connect the field experience to pedagogy and theory-building, and the opportunity to engage in dialogue with the PST rather than just grading an assigned paper. The biggest drawback in using e-journals was the demand on faculty time in responding to 22 – 23 e-journals each week.

In discussions on the listserv, students' responses were not reflecting what was being studied in the methods class. For example, responses to questions regarding how students become engaged in learning indicated that the majority of PSTs responding were focusing on classroom management and control as reasons that children were learning. This concurs with Benson & Meyer (2000). Most responses reflected the belief that children learn because the teacher has created an environment that gives children clear rules and negative consequences if they do not focus on learning. Only eight of the PSTs (17%) responded in a way that reflected the perspective that learners are engaged because the activity is meaningful to them and they are interested in constructing understanding. Of those eight PSTs, it is not known how many responded this way as a result of being in the methods class and how many held that theory about teaching and learning prior to enrolling in the methods class. These responses were used by the professors to continue engaging in activities and discussions with the PSTs about what their own learning theories are.

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A Summary of : A study of Critical Learning Incidents in a Traditional Classroom and an Asynchronous Learning Network

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If we teach today, like we taught yesterday, We rob our students of the future.
John Dewey

America has approached education as the means to success; therefore, it is important that the widest access to its educational institutions be provided for its people. College students will soon face a new landscape as the delivery of educational services on-line (OL) becomes an integral part of higher education. In addressing the question *How, if at all, does in-person reporting of critical learning incidents differ as compared to the reporting of critical learning incidents by asynchronous On-line (OL) students taking the same course with the same instructor?*, it was important to understand what was going on with the students' and instructor's perception of the class in each venue. To establish references, the instructor prepared a pre/posttest that asked the students to rate their knowledge of key topics to be covered which provides insights that will allow the reader to see how the students recalled and reported their critical learning incidents (CLI) from the course in the two venues. During the 8week course, the traditional class (TC) met two times a week on Monday and Wednesday. The researcher conducted interviews by phone after the Thursday class was completed and prior to the next week's scheduled class. Both sections were required to have assigned work posted to their respective Web discussion forum by Friday afternoon. Open-ended questions were used during the interview allowing the researcher to monitor any transformative or reflective learning that the student reported. The researcher obtained critical incidents during the course of instruction from the TC participants, or, in the case of the on-line class (OLC) participant, during the course of engagement of the material OL and any correspondence conducted with the instructor.

At the class start date, the instructor provided the researcher with a list of preregistered students--27 for the TC and 21 for the OLC. Twenty (87%) of the TC completed the course with a total of 10 As, 6 Bs, 3 Cs, and 1 D. Fourteen (65%) of the OLC completed the course with a total of 12 As, 1 B and one incomplete. Fifteen students in the TC and 16 students in the OLC initially agreed to participate. Ten did not participate due to varying reasons. A total of 21 completed the study with 10 in the TC and 11 in the OLC. This study confirmed results found in many previous studies in that there were no differences in performance between the two groups when comparing grades and GPAs. However, this does not necessarily indicate "No Differences" in student learning. The reporting of critical learning incidents provided more insights into what the real differences are between the traditional and asynchronous learning venues. For instance, none of the OLC asked for clarification or contacted the instructor to expand upon any of the material. Additionally, none of the students corresponded with other members of the class.

It makes sense to associate learning with the reporting of what the student deems to be a CLI. Often additional probing questions were asked to determine if the incident was a CLI. While details about a reported student's CLI were not solicited, further review of the transcribed interviews disclosed that there was more specific detail about the various learning incidents reported by the TC than the OLC. To identify this more clearly, Table 1 on the following page shows the key topics taken from the pre/posttests prepared by the instructor and they are noted as mentioned or described in detail by the students in both study groups.

Table 10. Pretest/Posttest Key Topics Covered

Students mentioned these topics in citing or recalling most of their critical learning incidents--simple references are in the column labeled "Mentioned" and those voluntary responses with specific details are in the column labeled "Described in Detail." Some mentioned topics were not counted as true critical learning incidents, but counted in this table as at least recalled by the student. The TC mentioned the pretest/posttest topics 84 times as compared to 56 by the OLC. Additionally, 43 (79%) expanded and detailed learning incidents were recalled by the TC versus only 17 (21%) from the OLC. The content of these explanations from the students, who were able to recall specifics from the material or class discussions, provided meaning to general terms such as population and culture. These explanations were reflected in the brevity of the TC's responses and in the attention to detail that was included in the response without the researcher's solicitation request for more detail.

The critical learning incident technique used in this study incorporated the personal phone interview approach. This allowed the researcher to collect information informally by having the participants recall their experiences and "critical learning incidents" from the past week that they associated with the course. The incidents were not confined to just learning the material. For instance, two students reported that listening in class was a critical incident in regards to taking the tests. Some critical incidents were not about success or understanding of the material but related to issues about accessing the Web site, audio files, or responding to the postings of questions in the discussion forum. However, the real success of the inclusion of the critical incident technique in this study resulted in providing more insights into what the real differences are between the traditional classroom and the asynchronous Internet OL instruction format. For the TC's the classroom lectures and discussions influenced their learning and reporting of critical learning incidents in practically every noted critical incident. Conversely, for the OLC, the text and audio provided one source of critical learning incidents and the postings to the discussion forum provided another source. Approximately 30% of the critical learning incidents reported by the OLC came from the posting of essay questions and responses to the questions on the discussion forum. This was the closest type of interaction the OLC came to duplicating a resemblance to what is found in TC interaction. Additionally, the critical learning incidents were not as readily recalled and contained less depth among the OLC. While the OLC may have covered 25% more information, the recalling of more detailed information was displayed by more TC's than OLC's. The TC alluded to more detail and discussed with the interviewer more about the week's topic, the class discussions, and the instructor's lectures than the OLC. Additionally, the OLC did not reflect as much appreciation and respect for the instructor's knowledge as the TC. The OLC remarked about the Web site's ease of use, the quality of the information, and the helpfulness of the lectures (audio files).

From analyzing the interview data, it became apparent that the TC's respect for the instructor was not just because he was the instructor or had great technology skills. In more than one interview, most of the TC's remarked about how intelligent the instructor was, how engaging his lectures were, or how he remained neutral about any particular point of view during the lectures and discussions. The OLC did acknowledge interest and appreciation for the material, but for the most part, they saw the OLC as a way to work and squeeze in one more required subject for graduation without being tied down to a particular class meeting time that would interfere with their work or other priorities. The reporting of the critical learning incidents by the students shows the difference between the breadth of material covered by the OLC versus the depth of the issues covered by the TC during class discussion. However, even though the OLC did not report more detailed explanations in their recalling of critical learning incidents than the TC, the OLC reported the same increase in knowledge as the TC in the pre/posttests.

The CLI applied in this study provided true insights into the individuals in both venues of instruction. Without this qualitative information, this study would have only confirmed the findings of previous studies regarding performance and very few insights into the issues addressed in this study. However, when addressing performance between TC and other learning situations, such as OLC or other distance formats, studies need to make sure that both groups are starting from the same point or at least establish what these points are. The students and instructor that were included in this study and their candor during the interviews provided the sapience required to answer the research question and provided insights into mediating variables. Further applications of this technique can provide answers to many questions rising out of the rush to incorporate technology into education. It is important for advocates of both venues researched in this study to discuss and continue to research the issues that arise out of new approaches to learning in a manner that examines both the positive and negative aspects. This will stimulate the research which ultimately equates to better education techniques and more enlightened students. The application of the CLI disclosed the difference in regards to how much depth the TC could recall verses the generalities that the OLC discussed when reporting critical learning incidents (Sarkozi, 2001). Consequently, there needs to be more research into the depth versus breadth issue and perhaps associate the two issues with longer-retention studies. How much of the information can the TC recall after six months or a year about the subject matter as compared to the amount of information recalled by the OLC would be an important area to research further. Additionally, trying to compare TC's to OLC's may be the wrong approach. While not new, the infusion of new forms of technology is just beginning in higher education and should be recognized as a separate approach to educating students. While there is no demand for clarification and a lack of requests from the student for the instructor to expand upon the material, perhaps the better approach may be to address the interaction between the OLC and the material covered and explore the extent to which the learner finds new ideas and develops new knowledge.

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The complete data and information for this summary may be found in Author's Doctorial Dissertation at Virginia Commonwealth University

STUDENTS CREATING COMMUNITY: An Investigation of Student Interactions in a Web-based Distance Learning Environment

Elisabeth Logan and Kathleen Conerly *

BACKGROUND

Distance education in some format has a long history with many articles addressing its various aspects and its impacts upon the learning process. Comparisons between traditional and distance learning or extension courses date as far back as 1928[1], continue through the literature[2]and indicate little or no difference in course outcomes, attitudes[3], or retention of material[4]. In the earliest studies, distance education refers to mailed correspondence courses[5]. Later reports address results from radio-based learning[6], film, television [7]interactive television[8], computer-based[9] and eventually online or Internet-based classes[10]. Within these media, interactive[11], non-interactive, synchronous and asynchronous[12] are compared as well as class size[13], different subjects including foreign language study [14], and educational level (high school[15], undergraduate[16], graduate[17], vocational and adult education[18]).

Current reports from the distance and distributed learning community indicate that, as in the past, there continues to be substantial evidence to support high learning and retention rates among distance learning populations. However, more recent findings indicate that students in distance learning environments while learning effectively, often experience a sense of disconnection or lack of community with their classmates. Ways in which to reduce or ameliorate these feelings are being investigated from many different perspectives. Cook from Kent State University recognizes the possibility of a technology-inspired community without geography, but warns of the perils of failing to recognize the need for community among distance students and advocates specific strategies to meet these needs.[19] Childers and Berner from Penn State University report feelings of isolation on the part of both students and instructors and although proposing different specifics, also advocate fostering a sense of community. [20] Lesniak and Hodes also from Penn State University report research on the importance of developing social relationships in the classroom.[21] Moore asserts that there are inherently different patterns of communication peculiar to distance learning.[22] Muirhead from the University of Phoenix Online, discusses the importance of interactivity in the learning process and recognizes that this is especially true in distance learning classes.[23] Garrison, Anderson, and Archer from the University of Alberta, Edmonton report that social presence is an essential element in the learning process and greatly affects the nature of the learning process especially in higher-order thinking.[24] Dringus from Nova Southeastern University in Florida calls for a shift in perspective on the part of distance learners and advises them to learn to deal with feelings of isolation and singularity and to become comfortable with interpersonal distance. At the same time she recognizes the need for distance programs to create special activities to foster interactivity. [25]

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Judith Weedman of San Jose State University finds informal social interaction an important component of intellectual work and explores electronic conferences as media for developing a sense of community in distance learning environments.[26] Although exploring different aspects of community, these authors as well as many others appear to recognize a basic need for personal interaction as a part of the learning process and strongly advocate methods to foster a sense of community for both instructors and students in distance learning environments.

Being actively involved in distance and distributed education for the past six years, the School of Information Studies at Florida State University is dedicated to providing a quality learning experience for distance students, ensuring optimal experiences in terms of both intellectual content and social community. As such it seemed important to investigate and compare student participation in distance and face-to-face environments with particular attention paid to differences in social interaction. On two occasions (Summer 1998 and Spring 2000) distance and face-to-face versions of the same course were offered simultaneously using the same course material. Analyzing student performance these two separate semester pairs provided an opportunity to investigate and compare aspects of academic achievement, class participation, and community building within these populations.

THE STUDY

During the summer of 1998 and spring of 2000, two sections of LIS5780, Electronic Information Sources, were offered using the same materials and the same methods of evaluation. In both semesters one class was held in a traditional classroom environment and the other in a web-based asynchronous environment. This presented an opportunity to evaluate students in the two environments. Although many studies have reported no significant difference in the outcome measures of distance and classroom students, we collected data on weekly exercise grades, as well as final and midterm exam grades to verify this. Because we were particularly interested in examining evidence of student involvement in the two environments, we also collected data on the number and type of active questions or voiced participation by students in both groups.

Demographic information sheets completed by students at the beginning of each course and course evaluation forms submitted at the end of the term provide basic information about the population of each class as well as their evaluations of the learning experience. Data from these various instruments were analyzed to identify any differences between the two environments, where they occurred and the extent of the difference.

METHODOLOGY

Two courses in electronic information sources were offered in both distance and face-to-face environments during the summer of 1998 and spring of 2000. Assignments were identical for both environments as were the textbook and other reading materials. In summer 1998, two faculty members taught in both classes to minimize the possible influence of different teaching styles; in spring 2000, both environments were taught by the same instructor. The on-site class met twice a week during which class lectures were given accompanied by PowerPoint slides;

searching techniques were demonstrated online, and collaborative classroom activities were assigned. These activities were accompanied by questions and discussion of material being introduced or reviewed - the usual classroom scenario. The distance class was presented with identical materials, but the PowerPoint slides were posted on the course website along with Real Audio explanations for each slide presentation. Screen captures of a few of the more difficult online techniques were available as well as hints and explanations for the required exercises. In summer 1998, the class held threaded discussions sessions with the instructor two times a week; in spring 2000 the class "met" one night a week for an extended period. Collaborative activities were held during the regular discussion sessions. Students in the traditional classes took exams and completed exercises in paper format. Members of the web-based classes submitted exercises and examinations electronically. All graded materials were collected for each class. Brief biographies were requested from both on-site and distance students as were final course evaluations. All the discussion sessions held by the distance class were archived and transferred to a database for analysis. Questions asked by on-site class members were recorded during the class periods by graduate students who noted the date and the question, but not the identity of the requestor. These were collected and analyzed.

RESULTS

Demographics

The two web-based classes consisted of 41 females and 8 males (49 students). Of these, 48 (98%) stated they had considerable experience with computers and all said they were familiar with searching on the Internet. Thirty-three (67%) stated at least part of their work experience included libraries of some type. Other work experience included business, newspapers, editing, nursing, music, academic administration, science research, publishing, accounting and finance, teaching, advertising, paralegal, probation/parole officer, and retail sales. Six (12%) held masters degrees in other fields. All these students were enrolled part-time and most had full-time jobs or careers. Thirty-nine (80%) in these web classes indicated they were taking the class for career enhancement or in anticipation of a career change. Others mentioned specific skills they hoped to acquire or enhance.

In the face-to-face classes there were 30 students, 23 females and 7 males. Twenty-five (83%) indicated they were very familiar with computers and again all said they were familiar with Internet searching. Of the students in these classes, 23 (77%) said that previous work experience included library work. Other work experience included teaching, the military, retail management, and computer technology. Twenty-four (80%) of this group were full time students, although several had part-time jobs to support themselves. Approximately half of these students indicated career enhancement or career change as a reason for enrolling in this course.

Graded Assignments

On the graded assignments (nine exercises), very little difference was observed between the face-to-face and web-based groups. The average grade for the web classes was 4.56 of 5 with a standard deviation of .272. For the on-site classes, interestingly, the average was exactly the same ,4.56 of 5, but with a standard deviation of .237. The mid-term grades were similar with an average of 88.81 for the web classes and 86.55 for the on-site class. The final exam grade averages, were 87.99 for the web classes and 90.94 for the on-site classes; the final grade averages were 89.75 for the web classes and 90.17 for the on-site classes. As might be expected, none of these was statistically significant at .05. The scores are shown in Table 1. Standard Deviations are shown in parenthesis.

Table 1
Graded Exercise Averages by Class Type
None is statistically significant at .05

	Workbook Exercises		Mid -Term Exam	Final Exam	Final Grade	
Web Classes	4.56 (.272)		88.81 (5.22)	87.99 (5.98)	89.75 (5.09)	
On-Site Classes	4.56 (.237)		86.55 (6.44)	90.94 (4.00)	90.17 (3.30)	

Question Evaluation

Examination of the questions asked by the members of both classes, revealed four basic categories: Content, Logistics, Technical, and Evaluation. We defined the four categories as follows. Content questions requested information about course substance and included queries about Boolean logic, searching using suffixes and prefixes, searching terms with punctuation, as well as about specific commands such as rank and map. Logistics questions ranged from "Are we to read straight through the textbook chapters?" to "I'd like to know who I share a password with[sic]?" Technical questions requested solutions to network, vendor, and computer problems. Evaluation questions were not really queries at all, but were comments both negative and positive about the course and its procedures.

Recording, classifying, and analyzing queries from both web classes produced the following results. For the web classes, we obtained 2852 total queries Of these 298 (10%) were technical, 1073 (38%) were logistical questions, 576 (20%) were content questions, and 112 (3.9%) were evaluative. This still left 793 (28%) records that represented pure conversation or commentary among the members of the web classes. None of these records had substance that reflected content, logistical, technical queries, or even evaluative comments. They tended to be "At last we meet again... perhaps for the last semester!" and "Hey there! I'm hoping its the last...but it looks like the best!" Basically they reflected conversation among classmates. Both web-based classes demonstrated the same proclivity for conversation (35% in one class, 25% in the other)

For the on-site class, 443 questions were recorded Of these, 285 (64.3%)were content questions, 138 (31.1%) were logistical questions, and 19 (14.28%) were technical questions. Just one evaluative comment was recorded. Question categories for each group are shown in Table 2.

Table 2
Question Categories by Class Type

	Technical	Logistics	Content	Eval'tn	Conversation	Totals
Web Classes	298 (10%)	1073 (38%)	576 (20%)	112 (3.9%)	793 (28%)	2852 (99.9%)
On-Site Class	19 (4.29%)	138 (31.2%)	285 (64.3%)	1 (.2%)	0	443 (99.9%)

There are noticeable differences between the two class groups: logistical questions represent roughly 30% and 40% respectively; there is certainly a difference between evaluation comments; the number of content questions is dramatically higher for the on-site class, 64.3% and 20% respectively, and logically there are fewer technical questions posed by the on-site classes. The most interesting observation however, is the extensive amount of time spent in conversation in the web-based classes. At 28% in the web-based classes it is their second largest question category.

Examining the types of questions (rather than just the numbers and their categories) asked by the two classes illustrates an interesting phenomenon. Questions posed by the web class seem longer, more detailed, and to some extent more expressive of individual personalities, whereas questions from the on-site class are short, specific, and seemingly more spontaneous. Web class questions were often similar to the following. " I am a bit stumped by Venn diagrams. In theory I am o.k. but when faced with a blank page, they turn into pancakes -- I have seen the class twice and looked at the text; it's the complex statements that throw me."; Or "After several tries…for the article…I cannot get a hit. This is the most frustrating experience…The worst part is that what I am doing makes logical sense to me, but is not working which leaves me drawing a blank.?" On-site questions resembled " How do you know if a phrase is a bound phrase ahead of time?", "Should there be parentheses around computer?" To some extent these examples reflect differences between questions typed into a discussion group and those asked spontaneously in a classroom setting, but it does seem that web-based students are expressing more of themselves through their questions and that even this formalized exchange structure serves as a channel for something more than seeking simple answers. The large number of conversational entries would seem to indicate something similar as well.

Course Evaluations

Course evaluation forms for the web-based classes included questions about ease of navigation, clarity of instructions, usefulness of workbook hints, PowerPoint slides, RealAudio voice explanations, and screen captures; about group discussion sessions, course submission forms, and the availability of the instructor. Students were asked to respond to the questions by choosing from a 5 point scale. The form also asked for comments about these questions as well as about the best and least liked aspects of the course. Students were asked to rate their progress in the course and the degree to which the material has been understood. Although the response rate from the web class was low (32%), examination of these responses indicated that the Web experience had been a successful one for most students. All questions except for two had rankings of 4 or 5. Students ranked their progress as either exceedingly satisfactory or mostly satisfactory; and ranked their understanding of the course materials as either very good or somewhat good. Comments were largely positive and included enthusiastic responses to the value of learning a specific skill, appreciation of fast turn-around time for exam and exercise grades, PowerPoint with RealAudio overlay, and submission of assignments via the Web. Negatives included the text books, screen capture inflexibility, and the course length of the short summer term.

Course evaluations for the on-site classes also asked for responses to be ranked on a 5 point scale. However, because of the different class environments, wording was changed slightly and a few questions omitted that referred specifically to the web format. As in the web class, the on-site group gave most of the questions the highest two rankings. Here, however, in two instances, the ranks were at 1(lowest possible rank) and accompanied by comments regarding the speed at which lectures were given and the lack of time for discussion. All respondents indicated their progress was either exceedingly satisfactory or mostly satisfactory and their understanding of course materials as either very good or somewhat good. Comments from this group were also largely positive with negative responses to workbook organization, speed of lectures, and short course term. Positive comments were made about the course content, the instructor's patience, and the opportunity for hands-on practical experience learning a marketable skill. In general, course evaluations for the two courses were largely positive, although students in both groups from the summer session remarked on the limitation of an eight-week term. It does appear, however, that the web class had an advantage by being able to view and listen to the PowerPoint lectures in an asynchronous mode rather than trying to assimilate the material during a single class period. One student even expressed a wish to have access to the web slides as the distance students do!

CONCLUSIONS

Demographics

The demographic profile of the web classes is different from that of the on-site classes although consistent with those of many distance learning populations. This group of distance students was career oriented, experienced in the job market, and making a considerable effort of time and money to gain a higher level of education. All were part-time students and since many have jobs and/or families, enrollment in a class represents a serious commitment to learning. The on-site students although possessing some work experience expressed less interest in career building and more in specific course-related goals. Class grades demonstrate that outcome measures were not significantly different for the two groups; however, their approaches to the course and to the program appear to be somewhat different.

Graded Exercises

As might have been predicted from many experiences with distance learning formats over the years, graded exercises from both groups were remarkable similar with variations of only a few tenths of a point and no statistical differences. This was also true for the midterm examination. As has been mentioned, this is consistent with other studies of learning and retention of material by students in a variety of distance learning formats.

Question Evaluation

As we look more closely at the interactions and types of questions asked, it appears that the class environment does make a difference to the way in which students express themselves. First, many of the questions asked by the class of asynchronous learners revealed much more of their individual personalities as well as indicating a depth of previous thought and study not seen in the classroom. Second, the distance learners used the threaded discussion sessions for far more than clarifying concepts and asking questions. Almost a third of their electronic interaction consisted of purely conversational comments. Unlike traditional classroom formats which tend to limit the number of extraneous comments from participants, distance learning students seemed to feel no such limitation and used the scheduled discussion format to initiate and explore relationships with others in their class. Second, the difference in the number of content questions asked by the two groups is puzzling especially since the distance groups did exhibit much more depth in the questions they did ask. One explanation may be that in a classroom, as material is being presented, there is opportunity to ask for clarification of small points at the moment. In a distance situation, since the discussions are held only once or twice each week, many of the students have already investigated and answered initial questions about the presentations and assignments themselves. Looking more closely at the lists of queries from each group appears to confirm this. Many of the classroom content queries were short and directed specifically at comments just made by the professor. Queries from the distance learners were longer, more elaborate, and reflected some previous investigation of the topic by the student. If our intuitive sense is correct and distance students do assume more responsibility for their learning and are more actively involved, it may be shown not in the number of questions nor in the topics addressed, but rather in the nature of questions.

Course Evaluation

The course evaluations were largely positive for both groups with very little difference between the two. Both groups indicated they had learned the material and were satisfied with their progress. The major differences appear to be related to frustration with the speed of lectures in the on-site course and trying to assimilate material while taking notes, a problem not experienced by students learning in asynchronous mode. Since this particular course requires that considerable information be covered before students can complete the assigned exercises, there is pressure to keep the class moving along. Both groups enrolled in the summer session felt strongly that an eight-week term was not the most appropriate time period for this class.

DISCUSSION

Our investigation of the types of questions asked by the two class formats led to the observation that there were not only different types of questions asked, but different types of communication taking place within the two class groups. We found evidence for decided differences in the two environments especially in the types of interaction taking place in the classroom situation. Several factors appear to have contributed to the differences. First, the distance learning group had free access to the slides and lectures and so could watch them as many times as they wished. Students indicated they had watched some lectures three or four times. With an instructor not immediately available to respond to questions about the material, it seems that these students were able to assume responsibility for answering their own basic questions, saving the puzzling ones for the discussion sessions. The on-site class had single exposures to the lectures in most cases and used the time with the professor to clarify points largely specific to the material being discussed -- having had little time to absorb the material before class time. Course evaluations from this group indicated some frustration with this mode of delivery.

Second, it is possible that the considerable amount of free interchange among distance students was not only an important part of their connection to the group, but also reflected the relative anonymity of the web culture. Students reluctant to participate in discussions in an open classroom, may feel less intimidated by an electronic medium in which socio-demographic differences are less apparent. Whereas the classroom may be more inhibiting to free conversation, the presence of students on-site does encourage student interaction between class times: mutual help sessions, social contacts, and other student activities. It is interesting to note that in these investigations, distance learning students with little structure to support a social community, created one for themselves by usurping a large portion of the discussion sessions for informal conversation and by including personal notes and comments in their subject-related questions.

How many of these observations can be generalized to the larger population of distance learners, remains to be seen especially since student face-to-face communication varies in different course delivery formats. For the web-based course formats, however, it does appear that as indicated by the literature, students do feel a need for a learning community and will find ways to communicate and connect with their classes, even if these means have not been formally provided by the class structure.

From our investigation, it appears that there are basic forces at work within a distance education environment that are indeed different from those operating within on-site or face-to-face classes. Although recorded outcomes indicate few differences in the end product, the processes are decidedly different. For those of us engaged in offering distance learning programs, the message seems clear. Social communities are integral to an effective learning process for most students. If we are interested in providing a quality distance learning experience, we must include environments that fosters the necessary social community components.

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GLOBAL ACCESS TO E-LEARNING:
BARRIERS AND INEQUALITIES

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For many of us in higher education, the dawn of the 1990's found our campuses inadequately wired and our computer systems behind the curve. The majority of our institutions had few if any courses being delivered via electronic technology, and very few leaders in education even dreamed of the phenomenal impact of the technological revolution on what we now call e-learning. As a result of that unprecedented growth, the International Data Corporation (IDC) projects 2.2 million enrollments in distance learning courses in 2002 -- up from 718,000 enrollments in 1998, and approximately 85 percent of all two and four-year colleges are offering such courses.

Merrill Lynch recently reported that market forces are providing a catalyst for radical changes in the way education is delivered on a worldwide basis. The Merrill Lynch research into these market forces identified six megatrends -- technology, demographics, globalization, branding, consolidation, and outsourcing -- that are playing a significant role in this transformation. While these societal trends are precipitating a significant and global transformation in the teaching/learning process, the overwhelming majority of the world's citizens are being left behind as this revolution occurs.

To be specific each individual megatrend brought positive results that facilitated growth in the e-learning environment and, at the same time, exacerbated the disparities for poorly endowed educational systems. We shall analyze each of the six megatrends and comment on the real and perceived barriers and inequalities.

MEGATREND #1: TECHNOLOGY

Today, sophisticated web sites take billions of hits each year. Internet 2 is up and running, and a third generation of the Internet is well underway. New and improved computer systems are constantly coming on stream, and complex wire and wireless systems are booming in the marketplace. Multi-modal systems that include advanced videotaping, CD ROM, video conferencing, digital satellite uplinking, and on-line delivery allow educational institutions as well as corporations to increase dramatically their e-learning offerings. Among the latest technologies being tested are the delivery of hologram-like images over high-speed Internet connections, which result in learners receiving life-size images of their teachers in the distant classrooms wherever they might be located, as well as artificial intelligence and computer simulations being developed for the creation of adaptive, web-based courseware that will feature "pedagogical agents" or software "with personality."

But on the downside, perhaps the most disconcerting outcome of this spectacular high tech growth is the emergence of the "digital divide." We are not providing access to this technology for the millions of those who could benefit enormously from its use but who have no access to it. In the United States, "three-quarters of households with incomes over $75,000 have a computer, compared to one-sixth with incomes below $15,000". At a time when technical skill and the ability to communicate effectively are increasingly critical to economic success, it is tragic that 15 percent of 18 to 24 year-old Americans do not even have a high school diploma, one third of all adults have not gone beyond high school, and only 24 percent of Americans 25 years of age or older have a bachelor's degree. Thus in regard to this megatrend, our increasing reliance on technology confers both advantages and disadvantages. For those who "have," the benefits are ubiquitous and palpable; but for the "have-nots" the elevated emphasis on technology actually widens the gap with the "haves," and thus exacerbates the inequalities of access.

MEGATREND #2: DEMOGRAPHICS

Focusing on the United States alone, there are 76 million aging Baby Boomers who are planning to retire from the workforce in the near future, leaving the next generations to fill their shoes and support them in retirement. Educational achievement has trailed the demand for knowledge-based skills, and thus the gap between the haves and the have-nots has been widened. In an effort to span that chasm, the federal government established a "Title I program that allocates $8 billion each year to try to help disadvantaged children get access to teachers and computers." Yet "although secondary schools had a third of the country's more impoverished students, only 15 percent of the Title I money went to these schools." And to compound the effects of the digital divide, a recent report showed that "teachers' aides rather than qualified teachers were teaching many students in Title I schools."

We are hopeful that over the next decade more private corporations and progressive educational institutions will offer non-traditional, high tech programs to attract adult learners from all levels of educational attainment so that a record number of persons may become technically skilled employees. The problem abroad is even more profound: "less than 2 percent of the world is actually" on the World Wide Web, and "if we subtract the United States and Canada, the number is less than 1 percent". Unless we mount Herculean efforts to modify dramatically our efforts to reach those without access to the Web, we will consign a huge proportion of the world's citizens to permanent exclusion from the rapidly burgeoning high tech jobs.

MEGATREND #3: GLOBALIZATION

This trend implicitly acknowledges that our world is smaller than it ever has been; therefore the educational and economic opportunities before us are unparalleled. In the United States our post-secondary educational institutions are arguably some of the best in the world, and we have been preoccupied with meeting the needs of our students -- including international students -- in America. But if we wish to offer to students throughout the world, the ideas and practices that make our economy and democracy so powerful, we can't expect all of them to migrate to our shores: our education and training programs need to be delivered in multilingual formats with truly global accessibility. Otherwise countries that cannot educate highly skilled knowledge workers will continue to see skilled, high paying jobs lost to other nations.

MEGATREND #4: BRANDING

In a society in which loyalty to such highly recognized brands as Nike, Mercedes-Benz, Disney, and McDonalds is abundantly obvious, workers, parents and young people who have a broad array of commitments clearly demonstrate devotion to education brands. Historically, institutions such as Yale, Harvard, and Stanford have commanded brand loyalty. But as education is delivered in a larger variety of forms, new brands of education providers such as Sylvan, Phoenix, Barnes and Noble, or the National Technological University, will compete with the Dukes and Yales for recognition. However, the old brand schools aren't taking this lying down, as illustrated by Princeton, Stanford, and Yale forming an alliance to offer online courses to their alumni, and then recently adding Oxford University to that group. Pam Dixon contends that unprecedented millions of Americans are hooked on distance education because taking courses via electronic means allows them to earn a degree or certificate or license from a "name" institution while keeping a job and/or busy life intact.

Having said that, offering a recognized brand alone will not guarantee success. Companies like Cisco Systems, IBM, Microsoft, and many other corporations are maneuvering to establish dominance as competition and revenues soar. Branded franchises will become increasingly significant, as learners return again and again to the knowledge well.

But the e-learning literature does not show significant references to the "have-nots" on the far side of the digital divide. Brand name companies and established institutions of higher education are doing very little to bridge that gap.

MEGATREND #5: MERGERS AND CONSOLIDATIONS

With e-learning revenues escalating, this industry is undergoing considerable consolidation: Sylvan Learning Systems has acquired a number of education companies and in 1999 bought a majority interest in the European University of Madrid; then a year later they announced their acquisition of the controlling interest in the University of the Valley of Mexico, as well as a hotel management school in Switzerland. And Kaplan, Inc., a division of Washington Post, Inc., just purchased a chain of 30 commercial colleges.

As is the outcome with branding, so it is with mergers—the products are delivered to the "digital haves," and the "have-nots" seem to be left farther behind.

MEGATREND #6: OUTSOURCING

With today's emphasis on teams and "business ecosystems," corporations often find it is more efficient and expedient to focus on what they do best, and develop a web of suppliers for outsourcing partners who are capable of providing other resources and expertise when and where needed. Merrill Lynch estimates that almost 90 percent of multinational firms outsourced a portion of their business in 1995, compared to only 60 percent in 1992.

As we consider the future of higher education, our institutions may choose to become more nimble and responsive to our students not by attempting to expand the array of degree programs, but rather by partnering with sister institutions as well as for-profit corporations to develop programs of study -- especially in the domain of distance learning. Peter Drucker believes that is the only viable alternative before us: "With a potential market for continuing adult education thus embracing at least 40 percent of the workforce, conventional institutions no longer suffice. They are too expensive and insufficiently accessible in a physical sense."

But irrespective of which of these three approaches is used, for those of us based at traditional universities (i.e., those where most of the instruction is based on or emanates from the campus, and includes residential and recreational facilities for students) we must be sensitive to the "tragedy of the commons." By definition, students who are not physically on the campus are unable to share in the life of the "commons," such as having a cup of coffee with a faculty advisor and fellow students while sitting in the student union or playing a "pick-up" soccer game on the university quad. But we must make concerted efforts to ensure that as many of the resources as possible of the commons be available to e-learning students as well. Thus financial aid services, career counseling, chat rooms, and concerts should all be available electronically.

THE CHALLENGE

The decade of the nineties left little doubt in our minds: the new technology has changed education forever – whether it be pre-kindergarten, higher education, or professional development programs for working adults. For the most part we are enormously supportive of this transformation that will equal the paradigm shift caused by the invention of the printing press.

The American society, in general has been enthusiastically receptive to the new technology. And many of us have learned to use it globally to seek unparalled educational and economic opportunities.

Yet, in sifting through the megatrends, we find the persistence of the "digital" divide disheartening. Less than 2 percent of the world's population is actually on the World Wide Web.

Hence, the challenge. Leaders in both education and business must first become aware of this evolving problem and then begin seeking ways to address it. Obviously, the new technology affords tremendous opportunities for all societies, including those who are currently "have-nots." We sincerely believe that greater access to educational attainment will lead to more economic success as this technology is accessible to a substantially greater proportion of the world's citizens.

THE PLUS PROGRAM: A HYBRID ON-LINE/CONVENTIONAL APPROACH

Michael L. Nelson[*] and David Rice

ABSTRACT: *The Plus Program combines on-line and independent learning with the conventional classroom approach. This allows for the maximization of classroom and instructor resources, and also allows both the student and the instructor to spend fifty percent less time in the classroom. The Plus Program is now in its second semester, and has been generally successful. Primary challenges include identifying students that will most benefit from and be successful with this approach, identifying courses that can best be adapted to this approach, and identifying and/or developing appropriate resources for the student to use outside of the classroom.*

INTRODUCTION

The Plus Program combines on-line learning and independent learning with the conventional classroom approach. Whereas a typical class at International College (IC) meets one day a week for four hours during the semester, the typical Plus course meets one day every other week for four hours during the semester. This allows the more difficult material to be covered in class, supplemented by on-line and individual / independent work during the off weeks.

The birth of the Plus Program was essentially accidental. A 'push' was on to identify potential on-line courses within the Computer Information Technology (CIT) department. As each course was reviewed, it seemed as though the answer was always the same: some part(s) of the course would work well in an on-line environment, but other part(s) just did not seem to be tenable without a more conventional lecture approach.

After this rather fortuitous beginning, the Plus Program rapidly took shape and quickly became a reality. We discuss herein its benefits / strong points, the weaknesses / challenges of the approach, and things that we have done to make it work. Finally, we present our conclusions.

BENEFITS / STRONG POINTS

It was relatively easy to identify potential benefits and strong points of the Plus Program early on, all of which have 'proven' to be true.

The Plus Program allows both students and faculty to spend up to fifty percent less time in the classroom. This does not mean, however, that they are spending less time on the course itself. Students have to put in the time and effort during the off weeks to cover the assigned material and complete the assigned projects.

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The instructor has to put in additional time and effort to ensure that appropriate resources are available during the off weeks. This additional time and effort can be done at everyone's convenience, however, since it does not have to be done during scheduled class time. This is especially beneficial to our students, which typically are older more mature students, returning to college to complete their degrees (many of our students have families and full-time jobs, making it difficult to make the scheduled time commitment necessary for a conventional class).

The Plus Program also allows us to capitalize on web-based and computer-based learning technologies, often provided by textbook publishers and third party vendors. Using the conventional classroom approach, these resources are often viewed as 'nice to have' supplements which students can use to enhance the classroom experience. With the Plus Program, these resources are critical, providing the basis for the off-week efforts.

Maximization of classroom and computer resources is another definite benefit. Two classes can now meet in the same classroom, using the same computers, by alternating weeks. This allows the number of computer courses to be doubled without adding any additional classroom resources. This has drastically increased our return on investment (ROI), essentially allowing double booking of our computer classrooms.

While we thought that the Plus Program would be appealing to our students, we have been quite surprised at just how appealing it has been. Our students really appreciate spending less time in the classroom, putting in the additional time at their convenience. They also appreciate having a 'real live' instructor available to help them through the trickier portions of the material, rather than having to rely on e-mail, discussion groups, and phone messages that are typical of on-line courses. Bottom line is that the Plus Program has been quite popular with our students, and also a very successful marketing tool for Admissions.

WEAKNESSES / CHALLENGES

An additional strength of the Plus Program is also a challenge. The approach places more responsibility for learning on the student, resulting in 'student centered learning.' The challenge is in ensuring that the student does indeed understand the commitment and put in the additional time and effort required during the off weeks. We find that the approach is most successful with the motivated, self-disciplined student. Unfortunately, it is all too easy for a student to get behind and then struggle through the remainder of the course.

Attendance during regularly scheduled class sessions is particularly important. If a student misses a Plus Program class session, the instructor may not see the student for three weeks. Similarly, the instructor must pay close attention to the overall schedule to ensure that they are indeed covering the 'tougher' portions of the material during in-class lectures, and that appropriate materials are available for the students to use during the off weeks.

The packaging or pairing up of 'complementary' courses is also quite challenging. We have tried to choose pairs of courses that a single instructor could teach to the same group of students. This allows students to take two courses by attending one night each week. It also means that the instructor is immediately available during all of the off weeks since both courses meet at the same time. This has not worked well with courses that are in any way dependent upon one another, but has worked well for courses that have similar levels of challenge (i.e., similar prerequisites), but in different subject areas.

MAKING IT WORK

In this section we present some lessons learned in making the Plus Program a success. First and foremost is to make sure that the student understands that this is NOT a case of putting in less time for the same amount of credit. Rather, it is a case of putting in the same amount of time, albeit less scheduled time, for the same amount of credit. Again, this approach works best with motivated, self-disciplined students. Including the following statement in the course syllabus helps to reinforce the point:

> *Plus courses have been designed to accommodate students where work and/or family obligations limit their ability to attend class. The Plus program is only for that special student that has the discipline to manage his or her time. For many students the freedom to chart their own course is a welcomed learning option. Students can proceed at their own pace only if they manage their time efficiently.*

A strong schedule specifying what the student needs to do during the off weeks is also very important, as are detailed handouts and assignments. One instructor has found complex quizzes given during regular class sessions to be quite helpful. The quizzes include problems that most students cannot complete, generating much classroom discussion with hints from the instructor. The 'unanswerable' questions then form the basis for the student's work during the coming off week. This truly motivates the student to go home and explore the subject.

CONCLUSIONS

In summary, the Plus Program has been quite successful in its first two semesters. Students and faculty are spending less time in the classroom, yet support for the student and the rapport that is built in the conventional approach are still there. Students do need to have a good understanding of what is expected, and they need to make a firm commitment to doing much of the work on their own. It is imperative that a specific schedule is established and the instructor must push the students to complete all assigned work on time.

Since the Plus Program is relatively new, no firm results are available. However, we have not noted any drop in grades, nor have we seen any problems / weaknesses in follow-on courses. We expect to begin a more formal review of the approach during the coming year.

ABOLISHING THE SEPARATION OF 'CHALK AND STAGE'

John Tolsma

No matter what policy changes new Secretary of Education Rod Paige brings to Washington, American students should expect significant changes in the way they learn. There will be the traditional calls for smaller classrooms and longer school days, but changes I have in mind involve mood lighting, smashing special effects and the casting of celebrities. In other words, it is time to realize that the same people who entertain American students may be the best candidates to partner with educators to reach students. This partnership should occur even though parents and government have had good reason in the paste to lambaste the media industry for a perceived lax attitude toward education standards.

For too long, we have witnessed a "separation of chalk and stage" to keep the classroom from becoming a midway or an arcade of the mind. There is a fear of bringing the same production values to which students are accustomed in video games or at the cinema to the classroom. Thus, we have missed out on ways to make real connections with students by engaging their physical senses. Even with the advent of computers, students have primarily received information audibly or through textbooks even though studies indicate that students' rates of retention and learning are increased as more senses are engaged.

Students now have a better working knowledge and understanding of how the Electoral College works after watching TV news networks take us into the intricacies of how this ancient system works rather than exposure through basic civic classes. Being exposed to high quality analysis, debates and descriptions, most Americans have a newfound ability to navigate a stranger through the complexities of this particular Constitutional process. After three years of law school, I did not have as much understanding of those mechanics as I learned in five minutes of watching network newspersons Judy Woodruff and Greta VanSusteren as they utilized lively graphics, inventive flow charts and energetic commentary to make the subject come alive.

These short segment applications and lessons set standards for new ways to teach. It was relevant, of course, but the quality of those presentations made learning more engaging and compelling. Applications for better quality video programming in the classroom should extend past interesting news coverage, with original segments highlighting America's best teachers used to supplement in-class presentations. Today's student can travel around the globe to become part of the environment they are studying. Labs take on new meaning as students use the world as a workshop for ideas and experimentation. However, this must go beyond static images and slides and build a real connection between student and subject.

This occurs by capturing the students' attention with interesting music, lighting, talent and experiences transmitted via in-class video presentations or as broadband allows, over the web. Students are accustomed to multimedia. Half-hearted attempts to provide this method of presentation to "education customers" won't capture the students' attention. We need to add pizzazz to the ways we present Chaucer or Shelley.

I've heard two primary reasons for not being aggressive with multimedia in the classroom: soft content and distribution issues. Some argue that the inclusion of high quality video impacts the value of academic material that can be imported. As Edward Miller, former editor of the Harvard Education Letter has written, "Thoughtful critics argue that distance learning is frequently a counterfeit of education, replacing the essentials of learning with glitzy software and shoddy pedagogy" (Miller, 1998). More simply, special effects will reign over substantive education. On the contrary, quality video product in the classroom opens up the possibility to introduce difficult concepts or hard-to-communicate principles. High impact video forces the educator to be more creative in selecting the applications and processes used to teach. Some argue that the video products allow teachers to coast by, not preparing for substantive teaching.

Programming must also be produced in short segments that allow faculty members to develop the curriculums and add the informative segments rather than allowing the video programming to drive the classroom instruction. For example, at our company, we produce in-class segments that range in length from three to eight minutes to allow nuggets of instruction to be passed along without dominating the lesson plans. Allowing faculty to see multimedia instruction as a complement rather than as a substitute for high quality teaching allows for greater acceptance in the classroom.

The second objection is distribution. Some of the existing technology is cumbersome and difficult to use as many schools have outdated projectors and equipment. Most in-class video segments, however, can be distributed using traditional video players or through satellite technology. Regular feeds can join classrooms together and can be used to regularly update content.

The more promising avenue for distributing multimedia content is through the Internet, however. As distance education and broadband learning solutions become more commonplace, high quality video segments will transform the on-line learning environment from a series of chatrooms and talking heads to a library of compelling video content. Interaction will take on new meaning when users share common video experiences.

High quality video experiences create a common ground for users. Much has been written about the potential for distance learning applications, yet providers have been reticent about using broadband applications and have adopted a wait and see posture. At our company, we have a bullish attitude about the penetration of broadband. Everyone recognizes the question is no longer, "Will broadband be prevalent?" Rather, the right question is "When will broadband penetration justify aggressive use of rich media?" Our most progressive clients are using this time of waiting to experiment with different broadband applications so they will be ready to strike when the moment hits.

Over the last four months, our company has worked with professors at Duke, Vanderbilt, and the University of Tennessee to begin transforming the way rich media is used to teach. The successes we have seen merit an examination of ways that high quality video segments can be used to enhance the learning experiences of all of America's students. The media industry has not done a good job of presenting itself as a protector or promoter of strong educational values. It's time for this to change.

As the media industry begins to show good faith efforts to improve its content and marketing practices, we should look at ways to partner America's educators with America's entertainers to create experiences that maximize impact and capture the attention of today's youth. As these partnerships become more common, a new wave of production companies will rise up or spin out of existing ones to specifically target the market. That competition will only raise quality standards and will insure that the multimedia produced is of the highest caliber. So, as the new secretary takes over, I hope he will spend a little time in Los Angeles, New York and even Knoxville, Tennessee. Increasing funding for multimedia solutions is a goal that should be implemented quickly, can be measured easily, and will ultimately transform the way students learn.

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LEARNING, ROBOTICS AND CULTURE: A PROPOSAL FOR RURAL DEVELOPMENT

Claudia Urrea *

Rural education throughout the world, especially in developing countries, has been approached in different ways. Some approaches follow too close urban education models that provide future opportunities for children, but forget the rural community needs; and others, serve only the rural community needs, leaving children with few opportunities outside the rural setting. The goal of this proposal is to study how robotics and other digital technologies can enhance student learning, while also improving rural community life; and also to explore how the relationship between learning, technology, and culture can be employed in proposing new alternatives that can close the gap between current rural and urban education. In this paper, I will describe some aspects of the proposal and some example projects made by the teachers and children during some workshops done recently in a rural community in Costa Rica.

INTRODUCTION

The development of the community is reflected in the efforts designed to improve the economic, social atmosphere and of life of the community (Miller, 1995). Nevertheless, community development specialists have focused on the economics, ignoring the other aspects of development and the interrelation of such. What would be the appropriate strategy and tools for an integral development of the community in a rapidly changing world? In this paper, I briefly present an attempt to solve this question by proposing a methodology of work that looks to build strong school-community relationships.

THE PROPOSAL

The research methodology that I am proposing for this project combines the theories of Participatory Development and Constructionism. In one hand, some of the underlying elements of Participatory Development theory will be used to approach the community and create a team that will support and continue the work at the local level. On the other hand, Constructionist methodology of work will be used as mean to engage people in building their own knowledge and thus, creating their development.

Participatory Development is a process anchored to local values and knowledge, defined and facilitated through the participation of those whose lives are most directly affected (Piciotto, 1992; Rahman, 1993). It covers and builds upon concepts such as community, religion, sustainability and empowerment. I will operate on the principle that community-based development is a participatory process most effectively approached in a bottom-up fashion. Constructionism is

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both a theory of learning and a strategy for education (Papert, 1980). It builds on the "constructivist" theories of Jean Piaget, asserting that knowledge is not simply transmitted from teacher to student, but actively constructed by the mind of the learner.

One of the more important aspects of this proposal is the *curriculum*, which I called "evolving curriculum". The name evolving by definition refers to the nature of one being flexible and dynamic, and remaining in continuous change. The proposed curriculum, including its structure and initial projects, will keep evolving as the project continues at each of the pilot sites. The structure for the curriculum is built on the three main pillars: 1) community needs; 2) the current curriculum; and 3) strategies for development.

A key element to the success of this proposal is the creation of the appropriate *learning environment*. Ideally, the environment should allow enough freedom so learners can work on an immersed project-based learning (Bers & Urrea, 2000). By project-based learning I mean that learners can choose a project within a proposed theme of work. By immersing learning I refer to the notion that learners immersed themselves in the learning process by having a lot of time devoted to play and to explore their ideas in depth.

The use of *construction toolkits* that can support children and adults learning process is another important element of the proposal. I believe that the use of technology that allow people to build all sorts of artifacts as well as program them to interact with the world through sensors and motors is the first step even before introducing the elements of the curriculum. The proposed technology for the project is called LEGO® Mindstorms. It is a small computer embedded in a LEGO® brick. The Mindstorms brick has been under development for almost 12 years. It has been the result of the collaboration between LEGO® and a group at the MIT Media Lab lead by Fred Martin. The Mindstorms brick is an autonomous microcomputer that can be programmed using a PC. It uses sensors to take data from the environment, process information, and power motors and light sources.

EL RODEO, A RURAL COMMUNITY IN COSTA RICA

There are several sites for the RURAL project in Colombia and Costa Rica. El Rodeo, the community I am working with in Costa Rica, is a small community near the town of San Marcos, north of San Jose. The computer used for this site are part of a project called LINCOS (http://www.lincos.net/general/framese.html). The first effort to work directly with the school and the community started on spring 2001. I develop several workshops, which will be described briefly in the rest of the paper.

During the first workshop, I worked with the school principal, 4 teachers and few of their children who came to different sessions. I started by explaining the vision of the project and my interest on collaborating with the schools teachers. The rest of the workshop was mostly dedicated to work on a project using all the elements I have given to them, including the vision of the project. They formed groups and built projects, which they presented at the end. I asked them to think how they could use what the built to work with the groups of children at school. An example project that the kindergarten teacher and her two sons built was a smart classroom. She wanted to use the smart room for energy conservation, and to talk to the children about saving electricity and water. This project was pretty much related to her everyday life. She mentioned that she is always turning lights on and off and checking faucets, so water doesn't get wasted.

During this second workshop, I worked with 25 children from 3rd and 4th grades. We started with a games, and discussion about different aspects of their community. The children decided all the project they wanted to work on based on our discussions: some of them were related to transportation, which is a big issue for the community; others ones had to do with recreation, which is very limited; other groups worked on artifacts that need motors , they built a refrigerator, a washing machine, etc; and some of them spent time creating landscape with art materials and things they picked from the garden.

CONCLUSIONS

- It is important to establish different roles for the people involved with the project at the different levels.
- The School Plan will begin to incorporate some of the ideas we worked during the project. We identified a module on social issues and values and other one about conservation of resources, which will be designed in the near future.
- The technology and the programming language still difficult for not very experienced users. I am looking to include other options that support different levels of expertise, both for the hardware and software.

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PROJECT SL-IDE (SPEECH LANGUAGE-INTERACTIVE DISTANCE EDUCATION): UTILIZATION OF MULTI-COMPONENT TECHNOLOGY

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Personnel preparation and service delivery go hand in hand as we prepare young professionals to meet the needs of children with communication disorders and delays enrolled in exceptional student education programs. Throughout the country, the greatest shortage of personnel to work with exceptional children with communication disorders is in the public schools. These positions are either vacant or filled with out-of-field or under-qualified persons (often with individuals with undergraduate degrees, who lack academic preparation and clinical experiences in diagnostic evaluation and treatment with this increasingly diverse population).

The state of Florida, recognizing the limits of preparation available at the undergraduate level, passed legislation in 1989 requiring a Master's degree to be certified as a speech-language pathologist in the public schools. Due to the shortage of master's level personnel in the schools, superintendents and administrators lobbied and altered the legislation to allow persons to be conditionally employed with the requirement that they be accepted into a graduate program within two years. Problems of program accessibility and the necessity of part-time enrolment for these employees immediately arose.

In response to this need, the Department of Communication Disorders at Florida State University instituted a part-time distance learning Master's degree program (Project SL-IDE) in the rural Panhandle area of the state for currently employed, under-qualified personnel serving exceptional children with communication disorders in the public schools. Twenty-four distance learning students, from 10 school districts, are currently enrolled in this 10 semester program. This cohort began in June 1999 and will complete their course of studies in August 2002. Courses are transmitted via two-way audio and video from the Florida State University main campus site in Tallahassee, Florida to the University of West Florida Main Campus in Pensacola, Florida.

The courses in this program are being taught utilizing multi-component technology. The students will be prepared to provide high quality SLP services and to enhance educational outcomes and the quality of life of students with disabilities and their families. These objectives will be achieved through the following experiences incorporated in the scientist-practitioner model:

- didactic courses offered via two-way interactive audio-video transmissions to distance learning sites;
- an emphasis on developing critical thinking skills through cooperative learning and problem-based learning activities via web-based, interactive projects;
- an emphasis on translating research to practice;

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- opportunities for intensive supervised clinical practicum in four settings following relevant coursework and in conjunction with clinical practicum courses;
- provision of Regional Coordinators serving as Co-Instructors for didactic courses, as Clinical Coordinators for students at their sites, and as Clinical Supervisors;
- incorporation of content for working effectively with paraprofessionals and with interdisciplinary teams;
- preparation to work with culturally diverse populations; and
- completion of a rigorous, part-time master's degree program in 10 semesters.

Distance education is defined as any form of instruction in which the learner is separated from the instructor but is linked by technology that permits live, real-time interactive audio and video exchanges (Barker, 1989; Barker & Hall, 1994; Keegan, 1990; Simonson & Schlosser, 1995). The distance learning delivery method used for this innovative Master's level program is two-way interactive videoconferencing from the main campus in Tallahassee, Florida to the branch campus in Pensacola, Florida, which allows teachers and students to see and hear each other during instruction. Consequently, visual and auditory communication is provided at both sites.

One camera typically focuses on the students in the classroom, one focuses on the instructor, and one is dedicated to showing overheads and other graphics. In addition, there are direct interfaces for broadcasting videotapes and for computer presentations. The instructor views the students at the remote site on a continually available 32-inch television monitor in the back of the classroom. There are additional monitors that students and the instructor can see for showing the view from other cameras or the other sources of transmission. There also is a fax machine available for communication between sites.

Full-time, tenure-track faculty members teach all of the courses offered to the distance learners. In addition, the main campus faculty member teaching the course travels to the remote campus at least once during the semester and transmit the class from that site. The exchange of examinations, books, reference materials and other hard copy materials were facilitated by a weekly courier service. Textbooks are delivered directly to the campus bookstore at the remote campus.

There is a faculty member assigned to direct the program and facilitate coordination between the two sites. Each faculty member also receives release time during the semester prior to their teaching assignment for planning with staff who assist at both settings. Strategies for effective teaching via two-way interactive audio-visual transmissions are shared and demonstrated. To facilitate learning and development of technological skills and student relationships between campuses, instructors utilize CourseInfo, a World Wide Web tool that allows them to develop and manage course materials and interactive classrooms. Instructors utilize their personalized "web site" to post announcements, study guides and pretest; identify and describe weekly assignments; establish small groups across sites; and facilitate discussion boards and virtual chats. Students use CourseInfo as a means of downloading pertinent classroom materials such as the course syllabus, lecture notes, and scoring rubrics. Group work between sites is accomplished through the use of private group work areas that include discussion boards, e-mail, and electronic work sites.

To accommodate the needs of the working graduate students, courses are offered in the late afternoons or early evenings. Clinical practica occur during the summer allowing more flexibility in placement. Although the timing of the course offerings differ from the traditional program, the curriculum and departmental standards remain the same. The department is committed to maintaining the integrity of the distance learning curriculum in compliance with the American Speech-Language and Hearing Association's Educational Standards Board and its Council on Academic Accreditation (ASHA, 1993).

The curriculum offered to the distance learners initially focused on coursework relating to their school setting, and has expanded to coursework concentrating on adult disorders in other settings. Distance learners have been introduced to clinical methods for adults with aphasia, dysphasia, and voice problems in settings such as hospitals, nursing homes and rehabilitation centers.

Multiple opportunities are provided for students to receive hands-on experience with various aspects of technology. In addition to internet skills learned through CourseInfo, each student develops a personal website. The sites are an avenue to develop a portfolio and contain information such as personal and professional interests, pictures, and links to favorite websites, students past projects, and products from coursework and clinical practica. Weekly class meetings provide students opportunities to operate the technology utilized in the classroom. Class presentations, panel discussions, and small group work activities also provide teaching and learning experiences via two-way interactive audio-video transmissions. Assignments within coursework also require implementation and evaluation ofcomputer-enhanced interventions with children with communication disorders. The use of technology becomes not only the vehicle for obtaining the graduate degree, but also a means for improving the quality of intervention.

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INTEGRATING COMUTER AND COMMUNICATION TECHNOLOGIES IN DISTANCE COURSES: AN EXPERIENCE

Fantini A[1]., Dans M[2].

INTRODUCTION

This paper communicates our experience in integrating computer and communication technologies in grade courses of the Economy Faculty of National University of Patagonia, Argentina. The University has four Academic Units separated by long distances, at Economy Faculty there are teachers who travel from one to another, teaching the same course in everyone, to satisfy local demands. Sometimes the teachers can not travel because of adverse clime or bad operation transport.

The main goal of our project was assist the Economy Faculty in satisfying the local needs of each Academic Unit, by including computer and communication technology to build materials and delivery the courses.

THE DISTANCE EDUCATION MODEL ADOPTED

Today, the interest in distance education is especially high in places, like Patagonia, where the student population is widely distributed. Since, each region has developed its own form of distance education in accordance with local resources, target audience, and philosophy of the University. And, because there are different concepts of distance education, first, we will define our frame of reference for this project. To provide the criteria against which can be measured.

Its hallmarks are, the separation of teacher and learner in space and time (PER88), the autonomy of learning by the student (JON92), and communication between students and teachers, mediated by some form of technology (KEE95).

The theoretical issues on which instructional model is based, affects not only, the way in which information is communicated to the student, besides the way in which students make sense and construct the new knowledge (ONT96). Our project is based on constructivist principles. We take care about the form the information is presented, each course is designed centered in the learning student needs and styles (ALO92).

COURSE DESIGN CONSIDERATIONS

The instructional development process for distance education consists of the customary stages of design, development, evaluation and revision (WIL92). As we mentioned above, in designing effective distance materials, we must consider the goals, needs, and characteristics of teachers and students, but also, the content requirements and technical constraints. When the development group starts the design of materials, they always bears in mind that they have to facilitate the development of a critic attitude and ability to make decisions on the part of the

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students. In previous projects we analyzed this, if you are interested of it, you can read about it in (FAN99) and (FAN99a).

We recognize as a critical point of our project the technical constraints for the delivery system. We need to assure full courses access to all participants, in a region where electronic communications is an increasing field, but not totally developed yet. Then, we plan that someone, with a computer and modem, could be student of these distance courses.

Another important aspect we take care was the requirements of the target group (BER95). All of them are adults, with a job and most of them with family. They study in their spare time. Our distance education system design focuses on interaction between teacher and students, but also promotes the interaction among students themselves, to build a favorable learning environment.

We believe that, an important factor for successful distance learning is to maintain a high level of interaction of the students. It is the instructor's role, as a facilitator, to promote a high level of interaction in the course. By promoting group discussion of an specific topic or issue, by assigning individual practical problem, and sometimes, propose group activities, where the students are divided into small groups for a particular assignment, of for a project presentation. The teacher groups the students based upon the residence place and the common interests. Some answers are posted publicly, so that everyone in the course can read them, to promote the basis for sharing ideas and discussion among participants. In that way we write a set of guidelines for the teachers, including strategies for tutoring activities.

TECHNOLOGY FOR DELIVERY

We look at what is the communication and computation technology disposable by the participants. A 50% have a computer at home, and the rest can use one at the job. Not all of them have full Internet access, but all have electronic mail.

The University has one web page for each Faculty, with institutional information, there we put one page to each course to add the materials. The students could access web at the computational equipment of the Academic Unit; nevertheless they receive, by mail and email, all they need, if they have not full Internet access.

Electronic mail provides an effective way to interacting among the participants and the teachers, because allows them to send messages to each other. Also, we build a group mailing list of each course for students interacting themselves.

STUDENT AND ADMINISTRATIVE SUPPORT

It is widely known that, student support is more important in a distance education system than in a face to face one. The support is essential to fight the isolation and the frustration. The student assistance is a responsibility shared by the teacher and the administration. Somebody in the Institution, who might have contact with the student, must assist his or her expectations. Quick feedback with solutions is the politic adopted. If a participant do not receive feedback on his expectations, problems, responses, he o she will eventually stop posting messages, and probably leaves. The students are identified as individual persons for the teacher and for the Institution, and their needs are properly satisfied by all of them every time.

In spite of, all the best planning and technical support, problems occur. Preventing these, there are a telephone number accessible to the students and the teachers, at office hours, and a fax that allows student to access teachers 24 hours a day.

This education system design is inherently student centered. With a group properly motivated, we expect a high level of learning. We are sure that, will be better than the previous model, with teachers travelling once a month, and playing two or three intensive face to face classes in a few days, with pour or none support between one to next trip.

CONCLUSIONS AND NEXT WORKS

We design a particular implementation and delivery plan incorporating computer and communication technologies, according to the actual possibilities of the Patagonic region. To supply assistance to the Academic Units, on satisfying the requirements of the local students, and to be less dependent of clime and transport restrictions, in their courses implementation.

The plan is incremental. The next step is build delivery tools to offer full Internet access to the students, teachers and Institution. Now, the system ensures full access to all participants, yet with minimum equipment.

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AN ADVANCE ORGANIZER APPROACH TO DISTANCE LEARNING COURSE PRESENTATION

John W. Coffey[1] and Alberto J. Cañas[2]

INTRODUCTION

The idea of the advance organizer was suggested by Ausubel (1968) well before hypermedia, distance learning initiatives, etc., became pervasive. Ausubel suggests that advance organizers might foster meaningful learning by prompting the student regarding pre-existing superordinate concepts that are already in the student's cognitive structure, and by otherwise providing a context of general concepts into which the student can incorporate progressively differentiated details. Ausubel claims that by presenting a global representation of the knowledge to be learned, advance organizers might foster "integrative reconciliation" of the subdomains of knowledge - the ability to understand interconnections among the basic concepts in the domain. This paper describes a new approach to distance learning course delivery based upon advance organizers.

A computer program entitled LEO, a Learning Environment Organizer (Coffey, 2000), implements the approach described in this work. LEO is an editor/browser based upon concept maps (Novak & Gowin, 1984), which presents a graphical representation of the fundamental concepts in the topic of study, essential dependency or prerequisite relationships among the topics (if any exist), and links to instructional media that contain content pertinent to the topic. The student utilizes the organizer to view and access information pertaining to the topics to be studied. The system tracks student progress through the topics, displaying an indication of those that have been completed and those that have not. The remainder of this paper will present a brief summary of the types and benefits of advance organizers, and a more detailed description of LEO.

ADVANCE ORGANIZERS

The advent of the Internet and hypermedia/multimedia has given rise to a broad range of possible representations that may be utilized as advance organizers. Modern advance organizers take the form of text passages (Herron, 1994; Kang, 1996), graphical representations (Gay & Mazur, 1991), maps (Jones, Farquhar, & Surry, 1995), and description + pictures (Herron, Hanley, & Cole, 1995). When applied to hypermedia, advance organizers might present global concepts, indicate paths through the content, or foster access to individual components. Krawchuk (1996) presents a taxonomy of advance organizers that includes traditional textual summaries and basic themes that are presented before instruction, organizations rendered in lines and arrows (like flowcharts), and pictorial graphic organizers. The latter category includes concept maps that present nonlinear representations of information and knowledge to be learned.

This brief discussion of the literature documents the variety of advance organizers that might be utilized for a course of study. It is apparent that advance organizers have been used in a variety of ways to help students learn about a topic of study. The next section describes LEO, an advance organizer for online instructional materials.

THE LEARNING ENVIRONMENT ORGANIZER

This section describes a Learning Environment Organizer that is part of a distributed knowledge modeling system named CMapTools (Cañas et al., 1998, 2000). An Organizer takes the form of a graph (in the mathematical sense of the word), with two different types of nodes, instructional topic nodes, and explanation nodes that explain about the topics. The topic nodes have color codings to indicate student progress through the course of instruction. The Organizer presents both a global (context) view and a local (focus) view of the course structure, and a "Display Status Panel." Figure 1 presents a view of an Organizer pertaining to a computer science course entitled Data Structures.

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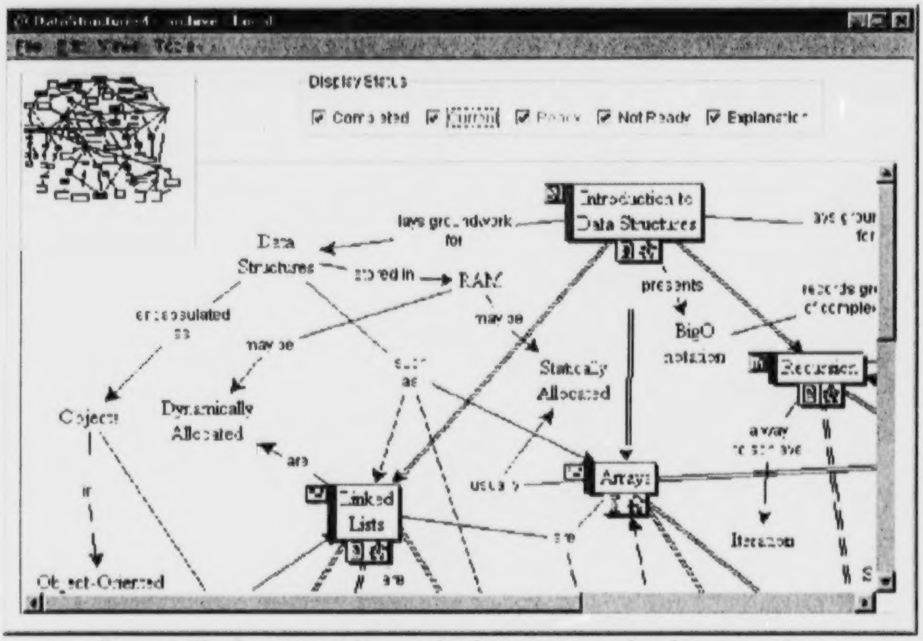
Topic nodes correspond to the topics in the course. Explanation nodes elaborate the relationships among the topic nodes and have no adornments. Figure 1 depicts topic nodes as those surrounded with shadowed boxes, populated with icons, and containing a rectangle on the left side that color-codes the status of the topic.


File Edit View Topic
Introduction to Data Structures
lays groundwork for
Data Structures
stored in
RAM
encapsulated as
may be
may be
such as
Statically Allocated
presents
BigO notation
Recursion
Objects
Dynamically Allocated
are
Arrays
usually
Linked Lists
are
Iteration
in
Object-Oriented
are

Display Status

☑ Completed ☑ Current ☑ Ready ☑ Not Ready ☑ Explanatio

Figure 1. The Organizer in User mode, showing topic and explanation nodes.

For example, "Introduction to Data Structures," "Linked Lists," "Arrays," "Recursion," etc., are topic nodes. The topic nodes are linked together by double lines that convey prerequisite relationships. Topics have links to the instructional content that can be used to learn about the topic under consideration and to perform the tasks or activities associated with the topic. When the user clicks on the icon that looks like a graph, a pull-down menu appears that presents links to online instructional content that is pertinent to the topic. The other icons beneath the topic nodes may be clicked to access other instructional materials, as well as the tasks, assignments, activities, etc. that are associated with the topics. These assignments may be rendered in text, in a video, or in any other form the instructor wishes to utilize.

The instructor can specify the criteria for completion of a topic. Several possible alternatives have been identified and implemented. The instructor may require a submission of a deliverable that must be evaluated before indicating that the topic is completed. The student could download a test (true/false or multiple choice) that could be taken and graded on the spot by an automated process, with the organizer updated immediately. The topic could be essentially optional or suggested, in which case the student might be allowed to decide when to mark it and move on. The icon on the top left side of the topic node indicates completion criteria for the topic. The icon that looks like an envelope indicates that a submission must be made to the instructor. The icon that looks like a smiling student indicates that the user marks the topic completed when s/he is ready to do so. The icon that looks like a text indicates that the student takes a test to complete the topic.

The context view of the Organizer appears in Figure 1 as the floating palette in the upper left corner of the window. A highly articulated organizer with many topics and a large number of explanatory nodes can grow very large and tangled, and may not fit on a computer monitor. A concern that the design of this software addresses is the need of the user to see the entire organizer

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while still being able to read a portion of it. A basic focus and context scheme has been chosen as an information visualization solution to this problem (Furnas, 1980).

The focus is the large rectangular component that fills most of the window. It is resizable by resizing the entire window. It contains the actual part that the user views. The user can grab the blue rectangle in the context view and move it around to move around the focus view. This mechanism is useful since it allows scrolling horizontally, vertically, or along arbitrary trajectories in a single mechanism, rather than only horizontally or vertically through two mechanisms, via scrollbars.

Students can freely browse through the materials in the Organizer at any time. If they wish to work on a course with the Organizer, they must first register with the system and log on. Once the student has logged in, the system either retrieves the progress record associated with the userid and the Organizer for which the logon occurred, or it creates a new progress record for the given Organizer and userid. The progress record contains information on the student's progress, submissions of deliverables, whether the deliverables have been graded, etc. When the student initiates the process of setting a topic to "completed" status, the system manages the process. If the student has permission to update the status of a given topic, the system automatically updates the screen display and the student progress record.

SUMMARY

This work describes a new approach to an online distance-learning environment that is based upon the idea of an advance organizer. The Learning Environment Organizer enables the student to access and browse online instructional materials. The Organizer provides the user with a graphical representation of topic sequences in the course, explanatory information regarding the topics, and tasks and completion criteria for the individual topics. The system tracks the user's progress through the topics in the course.

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MANAGING THE MANDATE:
Role of the Teacher in Distance Education

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INTRODUCTION

Distance education provides opportunities for instructors to extend and expand their classrooms beyond the confines of a building. It is also an opportunity to revisit techniques for teaching since distance education incorporates both place and time shifting (Herring & Smaldino, 1997). A *place shift* suggests that all the participants in the class are not in a single location, whereas a *time shift* implies that the instruction is not "live." Both these aspects of distance learning present instructional challenges to even the most experienced educators. Distance education is an opportunity to revisit the role of the instructor and the student in the learning environment.

ROLE OF THE TEACHER

Lesson Organization

A primary role of the instructor in an educational setting is to provide guidance in the learning process (Herring & Smaldino, 1997). Student-centered learning is a direction that is taking a strong hold in education today. In particular, it is important in a distance education setting to center attention on the student and to focus the instruction away from the teacher and toward the learners.

After the initial planning and preparation for instruction is completed, it is time to concentrate on issues associated with the delivery of the instruction. One issue is the organization of content. Key elements of each lesson should be outlined. Cyrs and Smith (1990) recommend incorporating no more than three or four major concepts or points in a 50-minute time period. Cyrs and Smith (1990) recommend that "teacher talk" be limited to 10 to 15 minutes and be varied by incorporating visuals and student interactions. Attention also should be given to the number and choice of visuals used in the lesson.

Another issue is time allotment. While the key elements of planning are essential regardless of the distance education format, the allotment of time for specific activities is crucial to ensure student success. Lessons should be planned to allow time for students to engage in the learning activities.

In a time-shifted Internet-based learning environment, it is important to ensure the instructions are complete so that the learners are not struggling with how to use the technology or how to respond to tasks. It is important to focus on independent learning tasks, shifting the role of the instructor to that of manager of the prompts to encourage student learning.

Instructional Methods

Teaching methods should be chosen based on the characteristics of the instructor, students, content, and delivery system (Herring & Smaldino, 1997). Due to the increased responsibility for learning placed on the students at a distance, methods that focus on the learners and incorporate interactivity have been shown to be most successful (Souder, 1993).

Besides determining the appropriate instructional methods to be used in delivering the content, the instructor should also determine ways to involve the class at all instructional sites. With some adaptations, the same methods and techniques that are successful in a traditional classroom setting usually work as well in distance instruction, especially if they encourage student interaction.

The instructor is responsible for the learning environment created in the traditional and distance classroom settings. The technology incorporated in distance learning should be considered as a tool to enhance instruction and not as an end unto itself. It has been suggested that if a strategy works in a regular classroom, it probably will work in distance instruction with some adjustment (Herring & Smaldino, 1997). It is important to consider a variety of techniques, but an instructor must remember to think of strategies that engage learners in active rather than passive learning experiences.

Teaching at a Distance

Beginning the Class. Developing rapport with students is important at the beginning of any class. Such rapport is essential to ensure a successful distance learning environment. This is especially true when the environment is computer-based.

Although a class composed of students who might know one another might not require introductory activities, groups of strangers, such as people across a span of distance within the class setting, can certainly profit from getting to know one another. Instructors, all too typically, merely warm up their groups of students with simple introductions. Instructors need to employ more directive and creative ways of helping the participants learn about one another.

Also, using elaborate techniques for introductions can reduce the lonely feeling that some students might be experiencing. It is important to finds ways to involve shy people. By investing time at the beginning of class for introductions, students will become more at ease with the setting and potentially will become more spontaneous in class participation (Herring & Smaldino, 1997).

Introduction strategies help the instructor demonstrate that the focus of the class is on the students, not on the instructor. Further, they give the instructor an opportunity to gather additional information about the members of the class.

Structuring the Class. In any instructional setting, students benefit when they have a clear view of such issues as class organization and student responsibilities. Class organization includes such items as class schedule, grouping for activities, and expectations for interaction. It is the responsibility of the instructor to ensure that students understand how the class is structured. These issues of format or structure are important to help students quickly and easily become involved in learning rather than focusing on trying to puzzle through the manner of delivery (Herring & Smaldino, 1997).

Instructors need to adhere to the predetermined schedules (Macfarlane & Smaldino, 1997). For synchronous settings, instructors need to maintain a class schedule that is congruous with the transmission schedule. For asynchronous distance learning settings, they need to post information and assignments in a timely fashion. They need to practice ways to use time wisely and to maintain the schedule of activities. Students need to know about the importance of presentation handouts if they are used and how to use them to benefit their learning.

Students need a clear understanding of their own responsibilities (Cyrs & Smith, 1990). They need to know what is expected of them in terms of preparation for class and participation in class activities. Further, students need to know how their participation in class discussions is measured (personal communication, R. Muffoletto, spring, 1997). Students who are reluctant to engage in discussion or are unprepared should be prepared to accept the consequences of nonparticipation if a portion of assessment is dependent on a certain level of participation. Instructors must assume responsibility to meet the needs of students who might be reluctant learners.

Students need training in communication protocols. In an audio setting they need to be prepared to use microphones or other audio equipment. Further, they need to understand their responsibilities to be courteous and well-mannered, in both audio and text-based communication formats. Respect for others is an important part of working in groups, especially at a distance (Herring & Smaldino, 1997).

Also, students need to assume responsibility for initiating communication with the instructor. Because of the venue, the instructor and students may not meet in person, but rather must meet via the technology. If students are having difficulty with the course or need additional information or assistance, it is their responsibility to contact the instructor. But the instructor must provide them with contact information.

Another related issue is what to do when there are technical difficulties. Provide students with alternatives. Students need to know what is expected of them. When teaching with technology, always assume the worst and be pleasantly surprised when everything goes well.

Preparing for Remote Resources. When preparing to work with students at a distance, it is necessary to consider the resources available to students. This information will provide an instructor with the data necessary for creating equal educational opportunities for all students in the distance education classroom. It is important for students to feel they all have equal status in the class regardless of where they are located. If this means creating new, different ways of achieving the same tasks, then the instructor must engage in creative endeavors (Macfarlane & Smaldino, 1997).

While many items deal with the mechanical side of the classroom resources, there is a human side to classroom resources. The presence of a facilitator is often considered optional, but this person can be important for the success of the distant instruction (Herring & Smaldino, 1997). A facilitator is generally an adult who has been hired by an educational institution to be a local contact for students. Facilitators' roles vary depending on their capabilities. They may be on-site during instruction, they may be available prior to and following transmissions, or they may be responsible for hardware and software performance.

No matter what the role of the facilitator, it is important to set up a time for discussion about expectations of each member of the team prior to starting the course, to avoid misunderstandings once the course begins. Further, it is important to share this information about the facilitator's role with students.

Summary

It is important to remember that distance education may be as new to the students as it is to the instructor. Preparing students for instruction is important in any teaching mode to maximize learning from class participation. But it is especially important to prepare students for settings where class participants are separated across distances. Students need to understand their responsibility to ensure a successful learning experience.

The instructor at a distance needs to be creative and imaginative in the design and structure of the course. One rule of thumb is that successful interactive learning experiences that work in a traditional classroom are adaptable to the distance learning environment. But they may require more than just some changes to the visuals or the handouts. They may require inventiveness and innovation.

Teaching at a distance can be a pleasurable experience for everyone involved, instructor and student alike. Keeping it interesting, and motivating the learners to remain active, can make it a valuable learning experience as well as fun.

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MENTORING ONLINE

Kijana Crawford

Mentoring is sharing: sharing power, sharing information, and sharing self. A mentor is the person who advances the acceptance of a talented individual into an inner circle. The task of the mentor is to introduce the protégé to the norms of the inner circle, to provide the protégé with opportunities to learn and practice, and to reward the protégé so that the protégé's knowledge, performance, and motivation is increased.

Mentoring is a form of adult socialization for professional roles (Moore, 1982, Educational Record). Often it involves a sponsoring relationship in which an individual is groomed or prepared for a position (Short, 1989) or, more explicitly, it is socialization to develop leaders. The primary function of a mentor is to provide a transition from the child/parent relationship to the adult/peer relationship in the course of development.

According to Darling (1985), mentoring is a process by which one is guided, taught, and influenced in one's life work in important ways. A mentor is a person who leads, guides, and advises another more junior in experience (p. 42). Mentoring involves feedback, criticism, passing on wisdom, and coaching, along with guidance and sponsorship of the protégé (Collins, 1983; Farley, 1981). It involves the sharing of power, advice, and information (Moore, 1982, Leadership in Transition). A mentor is usually an older, wiser, trusted person who guides a younger, less experienced person toward upward mobility, increased self-esteem, and greater confidence in the professional world (Collins, 1983; Dodgson, 1986).

Mentoring online creates challenges for the mentor since there is no face to face contact and a relationship has to be establish based upon what is written and how it is written to the mentee. The same challenges are presented to the faculty member who teaches an online course. Actually, the rules change when there is communication online since the mentor does not have the opportunity to look for facial expressions, hear tone of voice or pick up on other body language. What is written and how it is written and either advance the relationship or tear it down. For example, here is a response from a student who expresses her dissatisfaction with her grade, the professor and ultimately, having to take an online course as oppose to a traditional lecture course.

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Carrie writes:
I have a generalized statement to make

Out of the 65 students who are posted on the grade distribution, 93.8% received below an 84% on the test. That leaves 6.2% of the people with grades higher than that. I find it disturbing to think that these results are acceptable to a professor.

Here's a question. . . If Dr. Crawford doesn't write the tests, doesn't proctor the exams, doesn't present us with lectures or notes, didn't write the book or CD ROM, and doesn't correct the exams, a machine does that, then why couldn't a student be the professor for this class? Other than the fact the she has a PHD. I do understand that we are asked to do the critical thinking questions, which I find that I am spending so much time reading, watching the videos and fiddling with the CD ROM, that I don't have time to answer the critical thinking questions. Obviously something needs to be changed if 93.8% of the students received below an 84% on the exam.

Just my own critical thinking. I'm sorry, but I am disturbed by these results. I am anticipating that these next results will be a bit higher, but it doesn't remedy the situation.

Any others who have their own critical thinking question, or response to mine, I would love to see how others in this class are feeling.

Looking forward to your responses!

~ Carrie

Such is distance learning. You have the choice to take a course of instruction at an institution with a Prof. giving lectures or the freedom to apply yourself in learning the material via distance learning. Have you asked any questions of the Prof. ?
Just my two bits.

Mac

Thanks Mac for your feedback, I actually do appreciate it. Actually I didn't have a choice to take it Distance Learning or not, the lecture class was full. However I did decide to take this class anyway therefore I chose in that sense. Let me assure you I am applying myself to learn the material, I'm just retaining the information on the exams. I am understanding and retaining the concepts though. That's what really counts.

You'r welcome Carrie and by no means was I suggesting that you were not putting forth an honest effort. I just read your note about many other students having the same opinion and wanted to throw that out there for everybody. I've taken about 15 DL courses with RIT with various degrees of participation from the Profs of the classes. However, most of them have been about the same and in fact, some are quite bad at passing grades and assignments back until it is too late. I understand the frustration of taking some of the courses DL.

Good Luck,
Mac

Here the professor allowed another student to serve as a peer pal. Sometimes, the most effective person can be another student or a peer. Blackwell places mentors, sponsors, advisors, guides and peer pals on a continuum which depicts the degree of power. On this continuum, "mentors" are the most powerful. "Sponsors" are less able than mentors to shape and promote the protégé's career. "Guides" point out the pitfalls to be avoided and the shortcuts to be pursued. Mentors provide information to protégés while, on the other end of the continuum, "peer pals" primarily have a reciprocal helping relationship which includes sharing information and strategies. Also, "peer pals" as mutual sounding boards, advise one another, and confide and commiserate with each other.

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TWO MODELS OF WEBSITE PEDAGOGY: THEORY AND APPLICATIONS

Donald B. Egolf * and Ellen R. Cohn**

ABSTRACT

A basic theoretical premise is that instructor dictated website templates, or lack thereof, facilitate different student learning strategies, faculty engagement, and products. Two models of Website Pedagogy are described: the **Tabula Rasa Model**, and the **Shell Model**. Using the **Tabula Rasa Model,** the instructor challenged students to collaboratively construct a website in the absence of a template. The efficacy of these assignments as a generative learning device over traditional classroom assignments was marked. In the **Shell Model,** students produced web-based products following a predetermined structure. They authored PowerPoint presentations for a global lectureshare, and interacted with the Blackboard web-based course management software. Each of these software/ website templates influenced content generation. The templates appeared to inhibit the fullest expression of Website Pedagogy as a generative learning device. While both the **Shell and the Tabula Rasa Models** required significant technical support, the intensity and types of support differed.

THEORETICAL CONSTRUCT

Every instructional medium places demands on the person who delivers content through that medium. For example, content prepared for delivery to a university seminar must be reshaped for the lecture hall. When that same content is to be delivered through an electronic medium, further reshaping and customization is required to meet the demands of the specific electronic medium, forcing the content provider to continually interact with the material. This interaction is hypothesized to have a tutorial impact on the provider. In general, then, it is hypothesized that shaping content so that it can be delivered through a given medium is in itself a form of pedagogy. The specific theoretical perspective to be examined is that website design and construction is a form of pedagogy.

TABULA RASA MODEL - Panelist Donald Egolf:

APPLICATION 1: In the first test of this theoretical perspective, four graduate students enrolled in a graduate seminar on computer-mediated communication were observed over the course of an academic term as they worked on their group project, to develop a website dedicated to teaching public speaking skills. Each of the students had experience teaching an introductory college course on public speaking. The students were assisted by the seminar instructor and a webmaster who had extensive experience with website construction in the commercial arena. The analyses performed to test the hypothesis were qualitative in nature.

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There were three data sources: (1) All Emails about the project were sent to a distribution file which included the four students, the webmaster, and the instructor. (2) Minutes of weekly face-to-face meetings. (3) During the final seminar meeting of the term after the website was completed an evaluation session was conducted. Here the students critically evaluated the entire effort. The content of each data source was analyzed and the frequency of certain content themes were tabulated. The content analysis of the three data sources showed that the hypothesized pedagogical aspect of website construction was supported.

APPLICATION 2: In the above study it was reported that when teachers, experienced in their field, prepared a comprehensive teaching website, the teachers found the experience to be pedagogical. If constructing a website can have pedagogic effects for experts, then possibly it can have the same effects for the novice. This was the assumption tested in the present research. Specifically, one class in small group and team communication was taught using website-construction pedagogy, and a second by a traditional pedagogy. The two teaching methods were then compared using two formal evaluative criteria. Participants in the study were 60 upper-level college undergraduates, most of whom were in their final baccalaureate term. The students were divided between the two classes: 30 in the website-construction pedagogy class and 30 in the traditional pedagogy class.

The content domain to be taught in each class was the same. The traditional pedagogy class was taught through a combination of lecture, discussion, and experiential exercises. Students in the website-construction pedagogy class were assigned to one of six groups, corresponding to one of six content areas. And, each student was given a different textbook on small group and team communication to search for information on the student's assigned topic. In addition, beyond-the-textbook database searches were required. In each weekly class students had to report on the information acquired from their research and how this information might contribute to the construction of a website. In the second month of a four-month class, a webmaster began attending the class, and continued to do so for the remainder of the class. The webmaster prevented students from becoming sidetracked on the mechanics of website construction. By the end of the four-month class the six-part website was posted; it had both animation and interactive features.

To evaluate whether or not the website-construction was efficacious in teaching the topic of small group and team communication in comparison with a traditional pedagogy, two evaluative criteria were utilized. The first was a test of what small group and team communication concepts were learned. Here the same instrument was given to both classes and the results were evaluated by a 2x2 (groups vs. above or below the grand mean) chi-square analysis (chi square = 7.036. > .05). Since more website-construction scores were above the grand mean, this finding shows that the website-construction class scored significantly higher than the traditional class. The second evaluation criterion was the students' evaluation of their respective classes. The traditional pedagogy class was evaluated by an independent agency in the college. A high teacher ranking was achieved, meaning that the comparison or traditional class was not a "straw-man" class or a class that could easily be bested by a new method, in this case the website-construction method. The students' evaluations of the website construction class were equally positive; the evaluations distinguished themselves from those of the traditional-class students in that the website group gave comments about achieving a goal, a goal they thought they would never reach. They also were proud of their product and proud to have their pictures attached to the website. Five students noted that the website-construction experience was a key factor in their securing employment--employment not as computer specialists, but in the communication field.

The above study suggests that website-construction can be a most efficacious pedagogy. It can first of all teach, it can motivate, it can provide a clear goal, and it can provide a venue for the public display of the students' work. The pedagogy requires an instructor who is very knowledgeable about the subject, and a webmaster who can quickly resolve any computer-related problems.

SHELL MODEL- Panelist Ellen Cohn:

In the Shell Model, students produce web based products following a predetermined template driven structure.

APPLICATION 1: Students interacted with the Blackboard web-based software for a variety of instructional purposes, including those previously documented by Cohn and Stoehr (2000): http://imej.wfu.edu/articles/2000/1/04/index.asp. Both student and faculty users were required to demonstrate computer-based competencies. Three template-organizing influences operated in sequence to produce a fairly uniform learning shell. These were the: 1. Software template 2. University computer support's template alterations, and 3. Instructor content and template selections. There were far fewer customization possibilities by students than in the "tabula rasa" model. Thus, the "shell model" of web based pedagogy style would be characterized as more learner passive, and less encouraging of student collaborative learning than the "tabula rasa" model.

APPLICATION 2: Students authored PowerPoint presentations of course content in a graduate class in cleft palate, for posting on both a global lectureshare http://www.shrs.upmc.edu/supercourse/index.html, and the University Blackboard web-based site. Again, the design and organizational constraints of the PowerPoint software, and the need to prepare a relatively low technology presentation for global distribution, allowed for less web-based student generative learning and creativity. For both of these applications, adequate webmaster support was essential. This was provided behind the scenes and was fairly transparent to the students. While the templates appeared to inhibit the full expression of Website Pedagogy as a generative and collaborative learning device, the Shell Model required less in-class time than did the Tabula Rasa model.

CROSS CULTURAL TRANS-DISCIPLINARY DISTANCE LEARNING: U.S./SOUTH AFRICA PARTNERSHIP

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INTRODUCTION

The U.S.-South Africa partnership is an initiative to address public health issues in squatter communities, create an awareness of basic needs and problems in KwaZulu-Natal imijondolos, empower residents to develop good living habits, and promote cross cultural, trans-disciplinary distance learning. The U.S.-South Africa partnership evolved through a collaborative effort between faculty at Middle Tennessee State University (MTSU), Southern Illinois University at Carbondale (SIUC), and faculty at the University of Durban-Westville and other research organizations in KwaZulu-Natal, South Africa. This initiative was funded by the Association Liaison Office for University Cooperation and Development (ALO), United States Agency for International Development (USAID), and the White House Development and Democracy Initiative (EDDI).

Components of the partnership include research, education, and outreach. This presentation will address how a web-based course was developed to interweave all three components and facilitate cross-cultural, trans-disciplinary learning. The unique challenges from course conceptualization to implementation will be presented with solutions utilized in this project.

COURSE CONCEPTUALIZATION

Since the partnership spans two continents the research team developed a full web based course that would be offered to students from all three universities involved in the project. The advantages of web-based education include: easy access, quick student access, quick faculty access for revisions and updates, and reduction in printing costs. The disadvantages involve increased requirements pertaining to: substantial technical infrastructure, learners adopting a new way of learning, education of faculty related to the utilization of educational design, resource management, and substantial initial time outlay.

Developing the course required teamwork and preliminary planning. Weekly course preparation was not possible because information had to be available for students to work at their own pace. This was important in order to maintain course momentum and student interest. Team members had to develop familiarity with course software. They had to be risk takers since the restrictions of web design required alternative teaching and evaluation strategies. The course required faculty and students to be flexible and accept the role of risk takers.

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Faculty promoted life long learning strategies for students through web-based methodology. The research faculty addressed issues not normally involved in traditional classroom lecture courses. These included student knowledge level of computers, student access to peers and faculty, and a higher level of flexibility and course specificity.

An initial decision related to course development was where the course home site would be housed. The decision was made to house the site at the university of the majority of research and teaching faculty. The course was housed on the MTSU server. This permitted maximum access for faculty technical support. Organization and management of the website was faculty controlled which allowed access for modification of course components.

Faculty collaboration and identification of a standard presentation framework was critical in order to streamline standard course elements. Through this teamwork and group collaboration, the course was titled "Public Health Concerns for Informal Settlement Communities in South Africa." The course was broken down into five units or modules, objectives were outlined, text format for lectures was adopted, and the team agreed to utilize study data in required student assignments. The group also observed the three important elements in assignment preparation: flexibility, specificity, and clarity. During course development the group took cognizance of the human factor and ensured that readers were presented with visual clues and avoided lengthy, full screens of text. The team viewed the web as another valuable tool in the delivery of course content.

COURSE IMPLEMENTATION

This full web-based course on South African informal communities was offered for the first time in Spring 2001 to students at MTSU, UDW, and SIUC. The course was interdisciplinary and a cooperative effort of several departments of all three universities. Disciplines embraced health education, engineering technology and industrial studies, and geography and geology. This interdisciplinary aspect allowed students to sign up in any department or academic unit. Multi-campus site availability permitted students to sign up at their degree granting university. This allowed students to obtain individual university credit and obviated problems generally associated with transfer credit across universities. The course also allowed for individual faculty credit hour production within their own academic unit. Each university received student tuitions generated for faculty teaching courses. Additionally, the course could be tailored to fit academic requirements needed for each institution.

The course was very interactive. Components included links to course information staff information, course documents, communication, external links and student tools. Areas not required by faculty were easily removed. Students were oriented by email to components of the course software. These included the drop box for assignments, which allowed faculty a paperless mechanism to grade and return assignments. The communication area allowed for easy access for student and faculty interaction as it housed all email addresses. Students introduced themselves to the group by creating their own web page during the first week of the course. This allowed students and faculty a visual representation of individuals in the course. Communication also included the ability to chat on-line and have asynchronous discussions. A specific area was tailored by faculty to include the course syllabus and information, which facilitated student use. Faculty developed a calendar, which identified all course components and specifics related to assignments and evaluation methods. Course lectures were housed in folders by units. This clarified beginning and ending points for specific content areas. Faculty were cognizant of download time for course components and organized information in formats that were easily accessible for students in the U. S. and South Africa.

Benefits to the students are numerous and include usage of actual first hand data to learn, sharing experiences across continents, and cross-cultural learning through the exchange of cultures. It increases the technology knowledge level of many students. Benefits to faculty included learning a new format for instruction that allowed an exchange that could only be imagined several years ago. Challenges for faculty were mainly related to course and time management. Faculty found that maintaining a presence to students related to the course was more deliberate and active for the web-based course as opposed to traditional lecture courses.

CONCLUSION

The Cross Cultural Trans-Disciplinary Distance Learning: U.S./South Africa Partnership was both challenging and rewarding. It allowed faculty to expand their horizons and expose their students to a unique trans-disciplinary, cross-cultural experience.

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Part-time Distance Learning Master's Degree Program in Speech-Language Pathology

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Personnel preparation and service delivery go hand in hand as we prepare young professionals to meet the needs of children with communication disorders and delays enrolled in exceptional student education programs. Throughout the country, the greatest shortage of personnel to work with exceptional children with communication disorders is in the public schools. These positions are either vacant or filled with out-of-field or under-qualified persons (often with individuals with undergraduate degrees, who lack academic preparation and clinical experiences in diagnostic evaluation and treatment with this increasingly diverse population).

The state of Florida, recognizing the limits of preparation available at the undergraduate level, passed legislation in 1989 requiring a Master's degree to be certified as a speech-language pathologist in the public schools. Due to the shortage of master's level personnel in the schools, superintendents and administrators lobbied and altered the legislation to allow persons to be conditionally employed with the requirement that they be accepted into a graduate program within two years. Problems of program accessibility and the necessity of part-time enrolment for these employees immediately arose.

In response to this need, the Department of Communication Disorders at Florida State University instituted a part-time distance learning Master's degree program in the rural Panhandle area of the state for **currently employed, under-qualified personnel serving exceptional children with communication disorders in the public schools.** Twenty-four distance learning students, from 10 school districts, are currently enrolled in this 10 semester program. This cohort began in June 1999 and will complete their course of studies in August 2002. Courses are transmitted via two-way audio and video from the Florida State University main campus site in Tallahassee to the University of West Florida Main Campus in Pensacola.

If you have further questions about this initiative, please contact Linda Gessner, Department of Communication Disorders, 107 Regional Rehabilitation Center, The Florida State University, Tallahassee, Florida, 32306-1200, (850) 644-9141, lgessner@garnet.acns.fsu.edu.

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AN INVESTIGATION OF STUDENT PERCEPTIONS OF INSTRUCTIONAL STRATEGIES USED IN SYNCHRONOUS LEARNING ENVIRONMENTS

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ABSTRACT

Distance learning is one of the most rapidly growing innovations in higher education today. It has been instrumental in increasing student populations and in better serving the needs of existing students at many institutions. Faculty who prepare distance learning courses have the responsibility of delivering these courses with the same instructional rigor as on-campus courses. In this study, graduate level students were surveyed to determine their perceptions of the overall effectiveness of instruction in three distance learning classes. An item response and an open ended survey were administered to participants to evaluate the effectiveness of instructional strategies employed by the instructors and to determine the impact of technology in these courses. Findings from this research study as well as implications for educators will be presented here.

BACKGROUND

Distance education has become a reality in an era when universities are searching for ways to increase student populations and to better serve the needs of their existing students (Charp, 1999). This learning environment encompasses a combination of technologies, including television, videotapes, audiotapes, video-conferencing, email, telephone, fax, Internet, software and print (Merisotis, 1999). It has been speculated that this new form of learning will become a commonplace phenomenon in the next century and has the potential to create a new vision in education (Ben-Jacob, Levin, & Ben-Jacob, 2000). Some have even predicted a new role for teachers; one in which they will act more as social workers or guidance counselors to provide personal one-on-one tutoring and to teach collaboration and interpersonal relationship skills (Schank, 2000).

Should we, as educators, question these technologies and their use in education? Universities continue to add new technologies as they become available. Are we letting technology drive the learning experience? And, on a more individual level, where do teaching techniques come into play? The future may hold a different role for the teacher, but for now, effective instructional strategies are a large part of effective instruction. The literature on distance education includes numerous studies such as: student perceptions comparing online to traditional lecture class quality (Ryan, 2000), the achievement of students in distance education and traditional classrooms (Dominguez & Ridley, 1999), demographics of students taking online courses (Guernsey, 1998), staff training needs (Connell, 1998), support for faculty teaching (Bremner, 1998), and community and team formation in distance education classrooms (Berg 1999). There is a more limited body of research on the effectiveness of specific strategies used in the distance education platform. Some of these discuss the shifts in social relationships (Newson, 1999) and accommodating diverse learning styles (Ross & Schulz, 1999; Diaz & Cartnal, 1999). And a few studies suggest the use of specific instructional strategies such as online student portfolios, self-guided online labs, class cybersociety, effective graphics, organized readiness, and the need to adapt instructional materials (Goodman, 1999; Powers, 1999; Grubb & Hines, 1999).

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METHODS AND RESULTS

In this study, two classes consisting primarily of elementary and middle grades' majors were enrolled in core graduate education courses entitled "Teacher as Leader" and "Connecting Learners and Subject Matter." The third class was "Instructional Technology" and included students majoring in Instructional Technology. The technology was assessed at two levels in this open ended questionnaire by the graduate students. First, some students evaluated the effectiveness of the technology required to deliver the courses synchronously via satellite. The use of technicians on site was cited as an effective means of ensuring quality delivery of the course. "On several occasions, technology presented a problem because of delays in connections," audio problems and CyberClassroom receptions. Students also commented on their use of technology in individual and cooperative group presentations. Power point, videos, Elmo, Internet, Dreamweaver, Flash, Director, Freehand, Fireworks, and Netscape Composer were cited most frequently. E-mail and websites were used to communicate intermittently throughout the semester. Technology was cited as "a must. Without technology there would be no DE." Student comments clarified that the technology was critical to the effective delivery of the course and also concluded that video and audio problems "were not the instructor's fault."

For each of the three groups who participated in this study, the professor delivered the instruction from the university setting. In two of the sections, students were also enrolled at the university site. Although professors agreed to deliver the course from the university setting, one to four on-site visits were scheduled throughout the semester. When polled to this regard, students were extremely positive about the opportunity for face-to face interactions. Students at the university site unanimously felt an advantage over the distanced students because of the interpersonal relationships that developed via before and after class regarding class and personal activities.

Table 1: Results of Survey - Part I

Student reports of professors: N=56	strongly agree	agree	disagree	strongly disagree
Actively involved students	47	9	0	0
encouraged participation	49	7	0	0
respected students' opinions	51	5	0	0
stimulated critical thinking	47	9	0	0
gave hands-on experiences	33	23	0	0
consciously planned for the instruction events	39	17	0	0
prepared lesson plans based on needs of learners	25	31	0	0
encouraged the expression of differing viewpoints	50	6	0	0
used active, interesting audio visual aids	29	25	2	0

Table 2: Results of Survey – Part II

Instructional Strategy	Use in Class N=56				Effectiveness
	no response	not at all	some of the time	most of the time	5-1 strongly agree to strongly disagree
Direct Instruction	2	4	9	40	4.18
Group Investigation	0	3	17	36	4.48
Cooperative Learning	0	1	24	31	4.49
Question/Answer	0	3	17	36	4.31
Reflective Thought	1	0	28	27	4.43
Lecture	0	7	20	39	4.22
Presentation	3	1	28	24	4.48
Group Discussion	0	0	39	17	4.40

OPEN ENDED SURVEY RESPONSES

Students entered a variety of responses in this category ranging from personal comments about the process of distance learning to specific assignments to the value of this university program.

SUMMARY

Distance learning offers opportunities for the adult market to achieve graduate programs from our universities. As professors, we are charged with the task of delivering course content without compromising its rigor. This presentation is targeted at educators who need to know how to effectively teach in these synchronous learning environments.

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THE ROLE OF THE MENTOR IN ONLINE LEARNING

Carole Hayes

What is a "mentor" in the world of online learning? The mentor has been in Greek mythology and in practice an older guide to a younger protégé, usually both male persons. Catherine Hansman cites two recent authors' characterizations of the mentor role as follows, "interpreters of the environment" (Daloz, 1986) and as experienced persons "work[ing] with less experienced persons to promote both professional and personal development" (Caffarella, 1993).[1]

These latter day interpretations are more appropriate descriptions of the role of mentor in online learning as it is conceptualized and practiced at Florida State University (FSU). When entire degree completion[2] programs were designated for online development and implementation, staff in FSU's Center for Academic Support and Distance Learning, now known as the Office for Distributed and Distance Learning (ODDL, sought models of success in distance learning practice. The institution with the greatest longevity in exclusively distance learning programs was and is the Open University of Great Britain. Two aspects of that very successful institution's practice influenced the design and development of FSU's programs. These are: 1) materials-based courseware developed by a team comprised of a subject matter expert, instructional designer, project manager, web developer, and technical editor, and 2) the tutor--prototype for FSU's "mentor."

The OU model provides that a tutor has a cohort of students that are geographically organized, usually around a Study Center. The opportunity to meet with the tutor and other coursemates is afforded on a somewhat regular schedule. Telephone contact with the tutor is also an option that is frequently employed by students. Course materials are developed and packaged for independent study within a given timeframe. Exam days are designated thus providing another opportunity for students to gather in one location. The role of the tutor is to help students progress through their course materials, mark assignments, and provide feedback, i.e., "tutoring."

In a virtual environment, such as that developed at FSU to support degree completion programs in Computer Science, Information Studies, Software Engineering, and Interdisciplinary Social Science, the face-to-face meeting opportunity among students as well as between students and their mentor or instructor is assumed, for the most part, to be nil. Therefore, the role of the mentor is more demanding in terms of developing rapport and instilling trust in his or her online student group. Cohen in writing about the role of the mentor in adult learning cites four phases of the relationship between mentor and protégé:[3]

- The early phase in which trust is earned by the mentor

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[1] Hansman, Catherine, "Handbook of Adult and Continuing Education," Arthur L. Wilson and Elisabeth R. Hayes, Eds. Jossey-Bass, 2000, p. 493.

[2] The last two years of the baccalaureate degree in which all major coursework is completed.

[3] Cohen, N.H. "Mentoring Adult Learners: A Guide for Educators and Trainers. Malabar,, FL; Kreiger Publishing Company, 1995.

Florida State University

- The middle phase in which rapport is established and goals can be focused upon
- The later phase when mentors provide guidance and feedback
- The final phase, where mentors challenge their protégés to apply what they have learned

These phases can be also applied to the relationship that mentors establish with students in online courses. The efficacy of the mentor relies upon successful accomplishment of the first phase, establishing trust. In the online environment, the mentor is the student's safety net. FSU's mentors are trained to communicate early and often with students and to respond quickly, in all events within 48 hours. The goal is to provide a zone of familiarity and consistency that the student can rely upon in an otherwise remote and unfamiliar environment. When this is accomplished, the challenges a student faces in a new learning format that is physically remote from coursemates, devoid of a rigid schedule and academically demanding can be met confidently. The establishment of trust is basic to the goal of facilitating learning. The mentor provides a psychosocial contact as well as a content guide. He or she is truly a learning coach and is trained to be aware of the challenges to success that a remote learner faces in addition to mastery of discipline content. In other words, the mentor is encouraging.

The next three phases are ongoing throughout the relationship and apply to gaining competencies in both the technical (online) environment and in the academic content. For example, the course management system, Blackboard (Bb), is a tool to be mastered and, while well designed, it is not purely intuitive. Learning how to participate in threaded discussion, how to use an assignment drop box, or how to use the various modes of email each presents the need to identify goals (middle phase) or "troubleshoot", to interact (later phase) with the mentor who provides guidance and feedback, and then to demonstrate (final phase) competence in employing the tools effectively. Clearly, this is a process that recurs with each new learning opportunity in the course, as well.

The FSU mentor also serves a very valuable role in supporting the lead faculty. Courses are developed for asynchronous delivery by a team consisting of the subject matter expert (faculty), a project manager, web developer, instructional designer, technical editor, and graduate assistant. When the course is ready for deployment, the faculty member knows that he or she will have mentor support for remote students. The mentor serves as the first point of contact, thus reducing the amount of time that the lead faculty member must spend online or on the phone with remote students. Mentors also grade assignments and examinations at the discretion of the lead faculty member. The pivotal function served by the mentor results in more effective communication to the lead faculty since the number of contact points is reduced from 20+/- to one. Instructors report that mentors serve this communication function extremely well, thereby markedly reducing the necessity for repetitive interactions.

Mentors are recruited from community college faculty and adjuncts, advanced graduate students, professional organizations, word of mouth, the FSU web site, and by referral from other mentors. They have advanced degrees in the discipline they will support and must come to FSU for a three-day workshop. The purpose of the workshop is to begin the collegial relationship between mentors and their lead faculty, to train mentors in the use of the Bb course management system, to complete necessary paperwork (they are appointed as Courtesy Faculty in their department), and to train them in online communications skills that will result in the effective online student management described earlier. Mentors also meet the student support staff at ODDL and become familiar with resources available to them for problem solving and referral. Continuing education resources available to mentors following the 3-day workshop include a Mentor Handbook and an online Mentor Resource Website that is in Bb and dedicated to mentor issues, communications, and resources. The mentor coordinator (MC), a full time staff person in ODDL, manages this site and the workshop. The MC initiates and maintains communication with mentors throughout their association with FSU and models student online management behaviors and techniques by way of the Mentor Resource Website. The MC may also have focus group meetings of mentors in various regions of the state during the term, audio conferences, and online training and updates.

Mentors are evaluated by their lead faculty, by students in online surveys and random telephone interviews, and by the MC. Student performance during the first four terms of mentor-supported courses indicates an 87% completion rate and an 85% success rate (success is defined as a grade of C- or higher). An analysis by the author of free responses made during telephone interviews with randomly selected students who had completed courses supported by mentors showed that of 66 comments about mentors, 42 were positive comments, 14 were neutral, and 10 were negative. The preponderance of positive comments (52%) was directly related to the value of the role and *particularly* in terms of encouragement and clarification. The neutral comments were simply acknowledgement of a mentor role. The negative comments were predominantly (57%) about one mentor who had personality conflicts with a few students (no longer mentoring FSU students, as you can imagine). The comments were categorized as General Role, Encouragement, Engagement, Course Content, and Individual Personality. Following the first semester of mentor-supported courses, the teaching faculty were asked, "how valuable do you rate the use of mentors in your online course?" All chose Very Valuable on a scale of Very Valuable, Somewhat Valuable, Slightly Valuable, and No Value.

In conclusion, the mentor role as conceptualized and practiced in support of FSU's students in online programs serves to facilitate both student success and faculty satisfaction in an innovative degree design and delivery mode. It is, however, very early in the implementation and bears careful scrutiny and much more formal study.

VIRTUAL EDUCATION NETWORK

Dr. Gerda Kysela-Schiemer[1]

Virtual Education Network (VEN) is a successful Socrates Project, done by teachers of different types of schools in Lower Austria, students and lecturers of the Danube-University Krems in collaboration with the Institute of Technology, Oulu, Finland and the Technological Education Institute, Athens, Greece.
The project started in 1998 and was completed in February 2000.

In the project several dimensions of distance teaching were researched:

1. Can different school types be served by the same teaching materials?
2. Can teaching materials be developed for different culture areas?
3. Does a broadband teaching network with central storage facilitate the work of local teachers?

All the questions touched on are of supraregional importance and decisive for the positioning of the European Union in the area of the deployment of new media in the education system. In cooperation with colleagues from Finland and Greece an attempt was made to create a representative project for Europe.

The Finns were responsible for Northern Europe
The Greeks for the Mediterranean area and
Austria for Central Europe.

Teaching programmes from three regions were evaluated in these three countries, taking into account cultural differences. After specification of the aims, communication was largely via the Internet and video conferences. There were, however, direct discussions and visits to each of the individual countries.

What was our consideration?

The project had three essential aspects:

1.) Firstly - different school types:
    a vocational school
    a lower secondary school
    an upper school for general education and
    a primary school
should be linked to each other.

These different school types - they addressed different interest groups and different age groups - were to work on common central topics of interest. This different approach to a subject produced different insights. The schools learned mutually from each other. "Learning mutually from each other" was a central point.

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[1] Donau-Universität Krems, Austria, Europe

2.) Secondly this project - different school types working on the same theme in the net - was to be carried out in two other European countries.
What was the aim?

- evaluation on an international level
- exchange of experiences
- comparison of different cultural approaches

3.) Thirdly - planning and installation of a communication network connecting the individual, national educational facilities.

ABOUT THE COURSE OF THE PROJECT

The project ran on two levels:

- as a "project in itself" on a national level between different school types
- on an international level on which the national insights were exchanged and evaluated.

The target was to develop content independently in the three project countries which would be suitable for different school types. The application in different school types was then to be tested in Austria, while international acceptance followed via exchange and application of the individual national programmes in all three countries.

THE TECHNOLOGICAL ASPECT OF THE PROJECT

The ADSL network and its practical applications in the VEN Project – the abbreviaton "ADSL" stands for "Asymmetric Digital Subscriber Line" and solves a hitherto problem with the supply of broadband applications to businesses and households - particularly in rural areas.
ADSL makes a series of new uses and advantages possible for example for Telelearning: thanks to ADSL telelearning is possible in completely new dimensions. Multimedia instruction with interactive elements can be achieved without compromise.

CULTURAL DIFFERENCES

Apart from the objective of using educational tools for different school types, there was a second target: to use these educational aids in different cultural areas of Europe. We selected Finland as the representative of Northern Europe, and Greece as the representative of the Mediterranean countries.

We were involved with three language areas. What united us was a fourth language: English. The individual programmes and tools were developed in each country's own language and then translated into English to make them accessible to the other project partners. However, simple translation is not enough since there are also cultural differences of interpretation which are not communicated in this way. Misunderstandings purely based on translation errors can be easily and rapidly cleared up. Most problems arise in the intercultural area

The different languages were an obstacle to our project, but it was one that could be overcome. In any case, it represents an additional cost factor for international cooperation. Expenses that do not exist in the U.S.

We were confronted with, as John C. Condon calls it, the "Shadow of Babel", and that is a general problem in the European Union. In addition to all the other communication problems, the language was certainly a substantial barrier.
Basically, we noticed that the problem of translation was unavoidable in primary schools, whereas English was sufficient in higher grades. Even here though, differences were noticed in the different countries.
Small language groups, as we had them with the Finnish partners in the project, are to a higher degree dependent on internationally popular languages like English or German, and therefore have fewer problems with English teaching material.

SUMMARY

This field test showed

- that different types of schools can be served with the same teaching materials, which reduces the cost of development
- that pupils of different school types can learn from each other - sometimes more efficiently than from their teacher
- that teaching materials can be developed for different cultural areas (Greece=Mediterranean area, Finland=Northern Europe, Austria=Central Europe) and
- that by the broadband network a new form of distribution of teaching materials is established.
- Language is an obstacle. There are many materials like pictures or films that can be employed in a self-explanatory-way and thereby can lower language barriers. English programmes can only be used for higher school levels. In all other cases the individual texts must be translated into the national language, which means higher costs and misinterpretations.
- Some of the programmes prepared and tested were only suitable only for face-to-face instruction. Thus one must generally differentiate to what extent virtual education programmes are suitable - as support for face-to-face instruction and/or for interactive study by pupils.
- A clear prerequisite definition is necessary as an introduction. What basic knowledge is needed to use a particular programme. An individual didactical introduction giving a clear guideline from a pedagogical point of view should be given to the content sequences for special use in different school types and grades.

This project has already been further developed and the experience gained in it is flowing into subsequent projects and is creating new content in the area of teaching.

THE OPHELIA PROJECT: A MULTIMEDIA SHAKESPEARE SITE

Donald Laing[*]
Donald Snider+

In both sophistication and frequency, the use of computer-based instructional technology in humanities courses at the University of Windsor lags far behind the level of implementation found in science and mathematics courses, a trend that has been found elsewhere (Grégoire, Bracewell and Laferrière, 1996). As part of an attempt to overcome this lag, the Ophelia Project was developed as a demonstration site for the University's Virtual Lecture Hall, a flexible method of delivering multimedia presentations to learners by Internet or Intranet or CD-ROM, which enables faculty to present classes on-line with voice narration integrated with graphics, text, and digital video and audio clips. The aim of the project was twofold: (1) to develop a site which provides students with a stimulating and challenging on-line learning opportunity in a core area of humanities content; and (2) to demonstrate to faculty the immense potential in computer-based technologies to facilitate and enrich learning in ways that are entirely compatible with the goals of traditional teaching in the humanities.

The Ophelia project uses a variety of network technologies including, a standard html Web server, a streaming media server, an audio conferencing application and a Java audio recording applet. Although the technology is complex, most of the complexity happens behind the scenes. The technology is made to appear as transparent as possible. The primary user interface is an Internet browser used to access the main Ophelia Web site. Within the site, multimedia resources including audio, video and graphics are streamed to students over high speed and regular telephone connections to the Internet. Interactive student exercises are made possible by a Java applet that allows students to make and submit voice recordings. An audio conferencing application is used to allow students to collaborate and submit recorded dialogue. The tools required by students are free and they are easily installed.

A major strength of computer-based technology is its capacity to provide students with much wider access to instructional resources than can readily be offered through conventional classroom teaching. The Ophelia Project makes use of this capacity to engage students in an exploration of how the comparatively minor character of Ophelia in Shakespeare's *Hamlet* has evolved into a complex cultural icon that continues to stimulate thought and artistic creation. After establishing contemporary interest in Ophelia, the site takes students through a gallery of

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paintings that demonstrate how visual artists have represented her image in profoundly contrasting ways, and then encourages the students to use these images, and others available by Internet, to think constructively about their own views of Ophelia. Then, the site goes on to illustrate by means of video clips how these contrasting views of Ophelia have given rise to widely differing performances on stage and on film. Finally, the site takes the students' analysis of Ophelia into the realm of dance by showing how she has been realized in the *Hamlet* ballet choreographed to the music of Shostakovich. Ophelia is thus established and examined as a figure of wide and continuing cultural interest.

In addition to calling for written responses to a number of learning activities, the site attempts to involve students in activities that are in line with current approaches to the teaching of Shakespeare. The basic premise of these approaches is that students should engage the plays as performance texts to be acted rather than simply read (Gibson, 1998; Riggio,1999). In its fullest form performance-oriented teaching involves students in acting, directing, and producing substantial parts of a Shakespearean play, if not the entire work. More commonly, however, it leads to such practices as reading scenes aloud from different interpretive points of view and conducting comparative analyses of scenes recorded on tape or film. The Ophelia Project incorporates some key elements of this current approach in two ways. First, on the basis of the video clips provided, the students are asked to examine how several notable productions of *Hamlet* have portrayed Ophelia in the central scene of her relationship with Hamlet, the Nunnery Scene (*Hamlet*, Act 3, Scene I), and to analyze these performances in terms of the opposing views of Ophelia that have evolved through time. Second, the site calls for students to perform their readings of critical moments from the play involving Ophelia. While it would be foolish to suggest that the site makes possible the rich interaction between students and dramatic text that can ideally be attained in the classroom, it is nevertheless true that it does take students separated in time and space some of the way in that direction, and that it does offer a challenging interpretive activity of a form that is still all too rare in conventional classroom. For individual performance reading, the site makes novel use of the CARLA (Computer-assisted Recorded Language Assessment) Software created by Janet Flewelling and Donald Snider at the University of Windsor. Developed to enable foreign language instructors to assess the oral language performance of their students (Flewelling and Snider, 2001), CARLA can also be used to deliver one side of a dramatic dialogue for the students to respond to in character. An instructor can then listen to the entire recorded dialogue and provide feedback on the student's performance. The site also makes use of Windows Netmeeting to enable students working in pairs to develop differing interpretations of critical scenes from the play involving Ophelia.

Another acknowledged strength of computer-based technology is its ability to permit learners to progress at their own pace, and to pursue their own questions as they arise along the way. The site takes advantage of this strength in two distinct ways. First, it allows students to return to any segment of the narrative line and its supporting graphics at any time for clarification or further thought. Second, it provides a great many explanatory and enriching links that enable students to go more deeply into references which they may personally find puzzling or interesting, and to do so if and when they see fit. The claim has been advanced that user-friendly technology can reduce anxiety by creating a non-judgmental and non-threatening learning environment (Grégoire, Bracewell and Laferrière, 1996), and it is worth noting in this regard that many students sit silent in conventional classrooms unwilling to risk embarrassment by interrupting the flow of the lesson to pursue exactly the kind of concerns that the Ophelia Project site enables them to explore freely.

Scardamalia and Bereiter (1993) propose that learning technologies should be designed to allow contributions that are either publicly accessible or private. Such a design feature grants learners access to the work of others and enables them to compare their ideas and build knowledge together, but also provides a workspace for private reflection. In keeping with this suggestion, students working through the learning activities of the site assemble a portfolio of written and oral submissions that can be made public, either anonymously or credited, for discussion among the participants in the course, or used privately for further thought. In final form, the portfolio can be used for purposes of evaluation and comment by the instructor.

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LEARNER CLUSTERING TO FACILITATE INCREASED EFFECTIVENESS OF WEB-BASED LEARNING

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Michelle LaFleche**

INTRODUCTION

Web-based instruction can provide the connectivity and data access that is not available in the more traditional, on-site instructional systems. Data can be collected, aggregated and analyzed real-time in order to evaluate learner progress and overall system effectiveness. While there have been studies to evaluate web-based instruction such as using web page access history information (e.g. web site statistics), we believe there is additional potential in using learner instructional performance data to improve online courseware and educational systems. The Destinations ™ educational technology system (product of NCS Learn) enables the collection of a wide array of learner performance information that we believe could be used to further enhance the learning experience. We have the ability to use the multitude of learner performance data tracked by this system in order to 1) further individualize the learning process as well as 2) evaluate the overall effectiveness of instruction. The purpose of this study was to explore potential ways of applying the results of learner data analysis to enhance the system's functionality for our learners.

METHODOLOGY

There are many methods in which technology can be applied to data to help further refine the learning process, as well as to evaluate the overall effectiveness of instruction. One such method is to cluster learners into meaningful groups to detect similar learning patterns, and then enhance the system based on those patterns. Our plan was to use K-means clustering to first identify main groups of learners who performed similarly on the system's initial mathematics placement assessment. We would then examine the resulting clusters in relation to the learners' corresponding curriculum performance data to determine if any patterns could be established.

Our objective for using learner initial placement information was two-fold: 1) to determine if learners were accurately placed into the mathematics curriculum by the system, and 2) to identify learners who seemed to require additional instructional intervention. Three sets of data were selected to represent the diversity of the learners, as shown in Table 1.

Table 1: Data Sets

	Description	**# of Learners**
Data Set #1	**adult learning center**	76
Data Set #2	public high school	62
Data Set #3	GED prep	52

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First, a k-means cluster analysis was performed on each individual data set. We chose to identify four clusters because we felt this number would allow us to obtain a manageable number of groups, but yet still provide enough detail for us to detect any significant emerging patterns between the groups. Next, we identified variables that would provide information regarding how learners were progressing in the curriculum after their initial placement. These variables were 1) math activity average score on first attempt, and 2) overall math activity average score. An activity is an instructional element lasting approximately 15-20 minutes that covers a specific skill concept. In order to have "mastered" an activity, learners are required to obtain a score of 85%. Up to three attempts on a given activity are permitted. We felt the first attempt of a given activity would reflect a learner's current knowledge state of a specific skill, while the overall activity average score provided us with a more holistic view of how the learner was progressing. A one-way ANOVA was then performed based on the four cluster memberships using these variables.

RESULTS

Table 2 below shows the results of the cluster analysis for each of the three data sets. Also shown are the one-way ANOVA results of the variables first attempt average activity score and the overall average activity score for each cluster. The comparison of clusters against these variables yielded statistically significant results.

Table 2: Data Set Analysis Results

	Cluster Centers		ANOVA Results	
	Initial Math Level	**# of Learners**	**1st Try—Math Activity Avg. Score**	**Math Activity Avg. Score**
Data Set #1				
Cluster 1	1.0	4	58%	56%
Cluster 2	4.0	57	77%	76%
Cluster 3	6.0	13	84%	84%
Cluster 4	9.0	2	81%	81%
Significance			.047	.033
Data Set #2				
Cluster 1	2.0	17	56%	51%
Cluster 2	3.0	30	85%	85%
Cluster 3	4.0	13	65%	67%
Cluster 4	10.0	2	64%	67%
Significance			.000	.000
Data Set #3				
Cluster 1	4.0	5	78%	81%
Cluster 2	6.0	16	90%	90%
Cluster 3	9.0	25	71%	74%
Cluster 4	10.0	6	90%	92%
Significance			.038	.046

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INTERPRETATION

Based on the analysis results, site demographics appeared to have an impact on the clusters' initial math levels (see Table 2 above). For example, the public high school learners were using the system mainly for supplemental instruction instead of primary instruction. Therefore, they may have lacked the motivation to perform well. Or, they may simply not have possessed the skill level required to place higher. On the other hand, the GED-prep group, which consisted of learners who were participating voluntarily, tended to place high overall in the curriculum.

The instructional philosophy of the system is to initially place learners in their appropriate skill level, focusing on those skills with which they need the most assistance. Therefore, it is not expected that the learner is to master each activity with a score of 90-100%. This type of high average score may indicate that the learner is placed too low and therefore already comprehends the material. Conversely, a very low average activity score may indicate that the learner is placed too high and may not have the necessary prerequisite skills.

The majority of learners appeared to be placed correctly with average activity scores of >70% after initial placement. There were a few cases of high initial placement but low (<70%) average activity performance. In addition, some learners placed very low (e.g. level 1.0 or 2.0), and yet still performed poorly in activities (<60%). We used the average activity score information to help determine if learners may have been misplaced in the curriculum. For example, we would be able to see if learners had possibly been placed too high based on higher placement but low average activity scores, or too low based on higher activity scores. We focused on cases showing the possibility of too high of a placement rather than too low. This is due to the fact that the system has built-in mechanisms that move high-performing learners through curriculum more quickly. On the other hand, learners who are placed too high and consequently begin to struggle through the curriculum tend to become frustrated which may have a further negative effect on their performance.

There are several ways in which to use this type of information to further individualize the learning process. For example, to address learners who are placed low in the curriculum and are performing poorly in activities, the system may signal the instructor that these learners need extra assistance. Also, clustering to identify groups could be automated to provide detailed learner performance information for each cluster. Learners performing below a defined threshold for each cluster would then be identified for additional instructional intervention. In addition, reports could be generated that grouped like-performing learners together by skill area in which they are working. This would provide the instructor with information that could be used to direct some kind of small group instruction or collaborative learning project for these specific learners.

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WEB ACCESSIBILITY OF COMMUNITY COLLEGES' WEB PAGES

Marty Bray*
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Access and opportunity have become the hallmarks of post-secondary education. The community college extends far beyond the traditional, limited freshmen-sophomore experience and provides a setting where almost anyone can learn (Parlinchak, 1998). Community colleges serve all citizens and provide a range of services that support special populations. As the number of students continues to increase, especially among special populations, so does the need for support programs and services.

The World Wide Web (WWW) has become an invaluable resource for many people with disabilities. Accessibility across platforms and geographic distance makes the WWW an ideal universal tool for gathering and disseminating information (Heflich & Edyburn, 1998). In fact, it is estimated that 34.4% of community colleges use the Internet to disseminate training and educational programs to special populations (Gibson, 2000). Wong (1997) discussed using the Internet for increased self-advocacy by individuals with physical impairments. It is ironic, however, that while technological developments have enhanced and provided new exciting opportunities for the WWW, they have at the same time complicated and limited the accessibility of the content and resources for individuals with disabilities. Physical barriers are obvious accessibility concerns. Web page developers need to be just as aware that on-line barriers can create significant problems for some users.

The Americans with Disabilities Act (ADA) of 1990 provides the same civil rights protection to individuals with disabilities that apply as a result of race, gender, national origin, and religion (Button & Wobschall, 1994). Title III of the ADA directs that public facilities make reasonable modifications to control discrimination and support accessibility in policies, practices, and procedures (Council for Exceptional Children, 1994). In addition, the Perkins Vocational Act of 1984 has called attention to America's need to support individuals less fortunate as a result of birth or economic circumstances. The Act underscored the need for improving vocational programs and serving special populations of students.

Building Web sites that comply with standards for accessibility should be a high priority for Web page developers. To date, little research has documented the extent to which accessibility goals have been reached. The purpose of this study is to examine the accessibility of community college home pages and provide information on making them accessible (if they are not) to individuals with disabilities.

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METHOD

To examine the accessibility of community college home pages a descriptive study was conducted. The sampling technique used to select community college Web sites and the evaluation procedures are discussed in the following section.

Sampling

The population Web sites for this study was community colleges located in the United States. A list of 720 community college Web sites was generated using the search engine *go.com* (2000). A random sample of 260 community college home pages was selected for content accessibility evaluation in this study.

Procedures

Each home page was analyzed using the software package *Bobby 3.2* (Center for Applied Special Technology, 2000), which allows researchers and other professionals to evaluate Web pages in accordance with the W3C Web Accessibility Initiative's guidelines. *Bobby 3.2* produces a summary report that consists of (a) the number of Priority 1, Priority 2, and Priority 3 access errors, (b) user check data, (c) the types of accessibility errors, and (d) the ease in correcting the accessibility error. Priority 1access errors are problems that seriously affect the page's usability by people with disabilities. Priority 2 access errors are considered important for access but are not as vital as Priority 1. Priority 3 access errors are third-tier access problems that a Web developer should consider correcting.

Some accessibility errors cannot be confirmed using *Bobby 3.2*, but *Bobby 3.2* provides user check data that informs the user that manual examination and human judgment are required for examining a specific area of the home page. For a full description of the types of access errors see the *Techniques for Web Content Accessibility Guidelines 1.0* (Chisholm & Vanderheiden, 1999b). In this study only the initial home page was evaluated; that is, no links from the home page within the domain were evaluated. Scores for each home page were tabulated and further analyzed.

RESULTS

Of the 260 community college home pages randomly selected for this study, only 253 pages were available for evaluation. Approximately three-fourths (77.1%) of the home pages (*n*=195) were not approved by *Bobby 3.2* (2000) as content accessible. This indicates that at least one Priority 1 error (seriously affects accessibility) was detected on these pages. There was an average of 1.01 Priority 1 accessibility errors on the community college home pages. In addition, the average number of potential Priority 1 accessibility errors was 8.48.

There were three types of Priority 1 accessibility errors detected on the home pages. Most of the community college home pages (64.2%) did not provide alternative text for all images. A few of the home pages did not provide alternative text for image map hot-spots (17.3%) and did not provide alternative text for each applet (5.5%). All the Priority 1 accessibility errors were rated as easy to correct.

Almost all the home pages (99.2%) did not identify the language of the text. Approximately 90% of all community colleges home pages (a) did not specify a logical tab order among form controls, links, and object, (b) did not provide keyboard shortcuts to links, (c) did not provide a descriptive title to links, and (d) used deprecated (i.e., included elements that have been replaced by newer elements) language features. Using tables in home pages create additional types of accessibility problems. Community college home pages used tables to format text documents in columns (77.2%), did not provide a linear text alternative for tables (81.9%), and did not provide a summary and caption for tables (77.6%). Many of the home pages used movement in their images (78.7%).

Using color on home pages can create problems in differentiating items on the page. Most of the pages needed examining for foreground and background color contrast (92.1%) and used color fonts to convey information (87.4%). The majority of sites did not use an extended description to convey information beyond what was in the alternative text (84.2%). Again, the inclusion of tables on home pages could create potential accessibility problems. Most of the home pages needed to be examined for the use of structural markup to identify their hierarchy and relationship (80.7%) and examined for the presence of headers for the table rows and columns (72.4%). When scripts are used to convey information or functionality, alternative content needs to be provided (54.3%).

DISCUSSION

Community colleges have played an important role in the training and education of individuals with disabilities. This study provides empirical evidence that most community college home pages are not accessible to individuals with disabilities. With very little effort all the home pages could easily be corrected to eliminate the more severe Priority 1 accessibility errors.

Web developers at community colleges need to examine their Web sites for accessibility problems. It is strongly recommended that validation methods be used in the early stages of Web development, which will help make problems easier to correct and assist developers in avoiding many accessibility problems. Also, a knowledgeable individual and individuals with disabilities to ensure clarity of language and ease of navigation should examine each site. Creating home pages that are accessible to a diverse group of users would insure the universality of the WWW.

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DIGITAL MULTIMEDIA PORTFOLIOS: THE PLAN, THE PURPOSE, A PREVIEW

Dr. Terry Corwin * & Dr. Val Christensen *

INTRODUCTION

The project, to apply ability-based assessment as a tool in the Valley City State University Curricula and as a result enable students to complete a multimedia digital portfolio on CD-ROM prior to graduation, became visible on the campus in November of 1995. The campus secured a five-year Title III grant from the Federal Government. It funded equipment, personnel, and support for faculty training. The grant enabled the CD-ROM portfolios process to become a campus wide initiative. The portfolio is integrated into the curriculum through application of the University's eight Abilities and twenty-two Skills [See Table I]. The Abilities and Skills had previously been created by the faculty and adopted by the Faculty Senate. A project is assigned in most every course offered. In almost every academic course a project is assigned with rubrics from the selected Skill level for the course.

Valley City State University is a campus of about 1,100 students. Eighty percent of its students major in Education or Business. Two innovations on the campus made the CD-ROM portfolios a possibility. The first, in the spring of 1995 a campus technology committee made the decision to create one of the nation's first notebook computer campuses. In the fall of 1996 every full time student was issued an IBM Notebook computer upon registration. The notebooks allow students to create and save materials on their own hard drives. The faculty received their notebooks and appropriate training in February of 1996 (Tykwinski, Brown & Holleque, 1997).

A second innovation occurred that allowed the faculty to choose the CD-ROM format for the portfolios. The campus network was developed to allow fairly simple movement of large files from computer to computer. This made the saving of materials and creation of the CD-ROMs feasible for a large number of students (Tykwinski et. al., 1997). These realities make the ambitiousness of the digital multimedia Portfolio project more lucid.

To begin the diffusion of the portfolio process, a ten-member faculty learning team representing every academic division was established. These individuals began discussing the portfolio process and making decisions concerning the purpose, audience and expectations for the senior portfolio. Among the articles read and discussed by the team were Sheingold & Frederiksen (1995) and Gillespie, Ford, Gillespie & Leavell, (1996). The members of the group also received training on the hardware and software needed to create multimedia projects. The second year of the implementation process included one-on-one mentoring for ten more faculty. The process continued until, by the end of the fourth year, 85% of the faculty had been involved in the process. In the fifth year a priority was placed on mentoring new faculty. Also during the fourth year of the process, faculty stipends were provided for those who wished to generate Ability-based projects for their courses or produce program course maps that identified the connections between course and the Abilities and Skills.

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1.	Communications	Written, Visual, Spoken Performance
2.	Collaboration	Positive Interdependence, Leadership
3.	Effective Citizenship	Provides Service to Others, Teaches Others, Change Agent Skills
4.	Global Perspectives	Works with Diversity, Understands System Interrelationships
5.	Problem solving	Gathering Information, Problem Recognition, Creative Thinking, Systems Analysis, Decision Making
6.	Technology	Selects, Applies
7.	Aesthetic Engagement	Receptivity, Visualization
8.	Wellness	Self Management, Self Worth

Table I: The 8 University Abilities and 22 Skills

During freshman orientation following the distribution of the notebook computers, a four-hour computer basics session is held. The senior portfolios are demonstrated at this time. Necessary hardware and software skills for multimedia development are included in a required general education course taken by 95% of freshmen. These course activities include web page creation, scanning, CD burning, and audio & video capture. All other necessary expertise is integrated into existing courses and included in the curriculum content as needed for the projects.

Each division determines how and where their students begin to develop the portfolio and which of the Abilities are included in the senior portfolio. The projects are created with assessment rubrics that students must respond to when completing the project. The faculty in each academic program assess the senior portfolios prior to graduation. Education faculty assess the teacher education portion of the portfolio.

The division of Education was the first to fully adopt the portfolio. The senior electronic portfolio is currently required for the exit exam in the teacher education program. A one-credit senior electronic portfolio seminar is offered in each division during every semester to aid students in the development of their portfolio. These classes review the accepted layout of the portfolio, the types of projects that can be used and some of the technical skills required. The portfolio audience is also discussed in this seminar. In addition, a handbook for the senior electronic portfolio project has been developed which includes how-to steps and examples. A web site is available to assist the students. (http://www.vcsu.nodak.edu/offices/titleiii/portfolios.htm).

Beginning in 2002, each graduating senior will organize a digital portfolio and burn a CD-ROM for use by faculty in his/her major as an assessment device and/or by students as part of employment activities. Currently approximately fifty portfolios are submitted each year and 80% of those are from Teacher Education students. The other 20% are from Business and Human Resource graduates.

At the end of each semester, a day is reserved for graduating seniors to present their portfolios to a small group of faculty members. The faculty members then accept or reject the finished electronic portfolio. This process is still evolving with much evaluation and feedback instigating new change.

Students are increasingly perceived and treated as full partners in the learning process and institutional governance. A strong emphasis on what students must know and be able to do is surmounting traditional orientation toward courses and credit hours as the measures of learning achievement.

Beginning in 2001 all faculty applying for promotion or tenure will be required to organize and submit their material in a digital format.

Other university outcomes reported from data gather over a five year period by Dr. Terry Corwin is available on the web (Corwin, 2000).

A student survey given for a forth year in 2000 reports the in-depth opinions of our students concerning their learning and the use of technology as part of that learning. The Survey was created and correlated by Dr. Kathryn Holleque (1998), Division of Education & Psychology.

VCSU students will become self-directed, self-assessing learners. The use of portfolios in general classes and the completion of a CD-ROM portfolio gives students more ownership in their own assessment. The student centered tracking software for storage of projects will make students responsible for their learning materials.

VCSU will increase the appropriate use of instructional technologies, including notebook computing for improving teaching and learning. The student notebook computer initiative is central to the creation and saving of portfolio materials.

VCSU will produce graduates who demonstrate that they meet established standards of knowledge and abilities. The demonstration of the eight Abilities through the CD-ROM portfolio provides the vehicle. VCSU will streamline and reduce duplication of courses by focusing on the unique contributions of each course and its competencies for graduation.

The ultimate aim of the CD-ROM portfolio project is to complete a major transformation of institutional culture and practice that began with a mandate from the State Board of Higher Education in 1990, from a traditional teaching institution to a student-centered, innovating, technology based institution.

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XML – Tailor Made for Education

Bob Strunz [α]; Murray MacCallum[β]

Abstract.

The creation of digital assets in educational institutions requires that the creators in many cases be faced with the task of mining existing databases in new ways to extract useful, web-enabled data from them. This task is greatly simplified by the use of XML, particularly where the data may be from heterogeneous sources or be of questionable quality. This paper describes three situations where XML technology provides an institution with flexible, powerful and zero-capital-cost solutions to problems of this type.

Introduction.

The key to developing useful digital assets is in knowing what they are, as opposed to what they look like. Many institutions focus on developing templates for their information storage, which are based solely on visual attributes. This approach has a serious disadvantage; it allows no flexibility in terms of how the information in an asset is used because it is, by definition targeted towards a particular medium.

This approach breaks down completely when the consumer of the information wants to use a different medium for receiving the information. A visually impaired person might want to use a voice browser; a person on the move might only have access to a WAP phone. If however, information is stored in a fashion that tells the consumer what it is, all of these issues disappear. If a consumer knows what a piece of data actually represents, they can infer what it looks like from their particular context.

In educational institutions there are generally a wide range of documents that have a great deal of similarity. If the information in these documents is stored in a form, which retains its meaning, they can all be rendered on whatever medium is appropriate to the context. Consider the benefits to an institution if making a single change in one place could alter the look of every official document and if every document could be re-used in multiple contexts.

One technology that enables this to happen is XML, the eXtensible Mark-up Language, in the following sections, a description of the XML transformation process is given, then three case studies of how it is being applied in different educational contexts are presented.

XML How Does it Work?

XML processing has two stages; in the first place, the information to be stored is codified in a format that suits the provider and the consumer. This process, though it sounds complex, is actually very simple; a sample of how one might codify the papers for this conference is given below.

The structure is self-evident, the relevant information is "tagged", what is important to realise is that the provider of the information decides on what the tags are, there is effectively no restriction on this, the provider of the

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resource decides, ideally in collaboration with consumers, what tags will be used and therefore the tags are meaningful in the user's context.

```
<conference year = "2001">ICTE Tallahassee</conference>
        <paper>
                <title>XML Tailor Made For Education</title>
                <author affiliation="UL">Bob Strunz</author>
                <author affiliation="NUE">Murray MacCallum</author>
        </paper>
        <paper>
                <title>Knowledge-Based Design</title>
                <author affiliation="FSU">Walter Wager</author>
        </paper>
</conference>
```

This is "well-formed" XML and it can immediately be "transformed" into a form that suits a web-browser or any other output medium. This "transformation" is the second stage in the process and to perform it, we simply need a set of rules that describe how the material is to appear on any particular medium. The fine details of how this is done are beyond the scope of this paper, but are well documented, Marchal(2000); Bradley(2000).

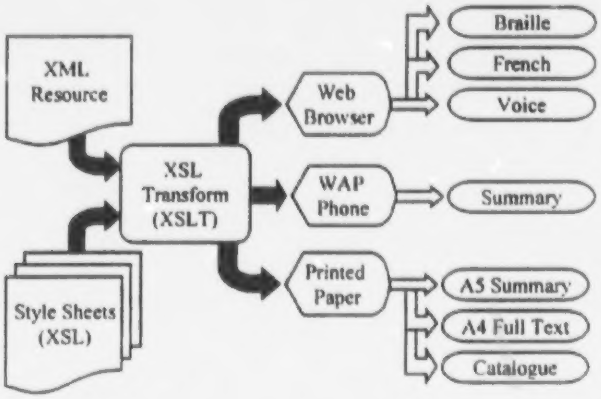

Figure 1 The XML Transformation Process

Figure 1 shows the basic process of XML transformation, that is to say the process that starts with a specific XML resource and a set of style sheets and transforms the resource using rules in the style sheets into a form which is consumable by a wide range of output media.

There are a great many books on the subject, and an in-depth treatment of it is not possible here, all of the software that is require to perform the process described by Figure 1, is freely available to anybody with an Internet connection, W3C(2001); ASF(2001).

XML In Practice; 3 Case Studies

In the following sections three examples of the application of XML in a University are described briefly, further information and demonstrations are available from the website **http://www.ul.ie/~strunz/XMLexamples/.**

Multi Lingual Lessons for Language Teaching

The task in this case was to develop a methodology, which would allow teachers to rapidly deploy specialised language teaching materials in multiple languages, French, German, English and Spanish.

The teachers had no expertise in the development of web-based teaching materials, however XML provided an elegant solution as it allowed the teachers to generate their materials in a form, which they could easily understand, and freed them from the task of laying it out.

In order to deploy a lesson, the teachers needs to learn a total of 12 tags whose meaning is clear in the teacher's context. It was found that teachers with no expertise in the area could, with help, be producing lessons after 2 hours of supervised practice.

An Expert System for Language Teachers

The use of authentic materials in language teaching is common practice. In this case a model, for their deployment was developed, Mishan(2000) and it was wished to codify this model such that it could be delivered on paper or via the web. The developer of the model had no previous experience of web design.

An XML schema for describing the logic of the model to the web-server was developed. The software automatically generates a valid navigational framework as it loads into the web browser. The models' author needed only to learn five XML tags, which were self-explanatory in her context in order to be able to input her information to the model.

The developer of the model spent three hours discussing her model to the software developer and then a further three hours learning to codify her data. The entire web-enabled model was deployed in one week from start to finish.

University Documentation

Universities and educational institutions in general generate large amounts of documentation, which needs to be authoritative and also has very wide applicability on a range of media and in a large number of different documents.

Module descriptions for example, might be used stand-alone, or in course descriptions, they might need to be available on the ordinary web, in a prospectus, or through the university's web-portal via WAP or a standard browser.

XML provides a very neat solution to this problem, by providing access to documents or fragments of documents in a unified fashion, the entire documentation process of the institution is being revolutionised. The data for this process is being extracted from existing databases and then validated using a combination of automated checking and manual verification.

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ELECTRONIC TECHNOLOGIES IN THE COLLEGE CLASSROOM: PARADIGMS FOR SUCCESS

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Successful use of electronic technologies in the classroom depends on many factors, the most important of which, we assert, do not hinge on technological savvy in itself. They depend, rather, on asking three questions: what is the job, is technology appropriate to the job, and what is the best technology to do the job? Answering the first question will involve the use of technology in the context, certainly, of an actual course or course entity, but also of the broader campus culture, which relates in a direct way to the mission of the university.

For example, the authors teach at a small university where class sizes are moderate (maximum 35). Small class sizes are an important factor in attracting undergraduate students and the university's commitment to keeping classes small is an important part of the culture. Furthermore, while there are some targeted initiatives in distance delivery – notably a Master's degree global leadership program; there is no mission- critical interest in using distance delivery in the mainstream undergraduate program. Thus, while electronic tools may benefit the classroom experience and may indeed lead to some cost savings by the university, the development of such tools has to be within the context of teaching in a small class context.

But there are other contexts. One successful example utilizing the electronic delivery of course materials to replace the large lecture (in a large, public university) is the method used by Richard McCray at the University of Colorado to teach the Introductory Astronomy sequence. Faced with lack of attendance in these large lecture sections, and by budget considerations precluding smaller additional sections, Professor McCray, using a Pew Grant, redesigned the course around teams of students working in small groups. The bulk of the course content is delivered on-line; students learn though individual on-line exercises as well as through discussion groups and group projects[i]. There is still one large lecture class per week; the campus mission and culture are preserved.

The University of Central Florida adopted a similar approach to improve its course in America National Government. There, the goals of the restructuring were practical as well as mission-oriented. The course enrolled over 2000 students in sections of 80-100 students. Classroom space was in critical short supply; increasing the number of sections was not a viable option. But the course also had a retention problem and surveys indicated that partially web-based sections had somewhat higher retention rates.

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Building on this, the department designed a web-based asynchronous learning environment based on web-based modules to encourage student participation. Class meeting time was reduced by two thirds. Bruce Wilson reports "students are, by necessity, more actively involved in the learning process. And instructional technology can also enhance students' critical thinking skills. … The use of the Internet in teaching Political Science gives instructors more opportunities to design activities that involve students' direct participation and to follow clearly set instructional goals."[ii]

Given that we are from a different kind of institution—residential, small classes, essentially the liberal arts model-- our experience has been different. Our goals are different. Pope's goal in implementing web-based tools was to increase opportunities for communication and participation in a computer science literacy class. The class is small (approximately 25), but there is a considerable amount of material to cover and the topics that dominate the headlines -- Microsoft Antitrust litigation, Privacy in Cyberspace, etc – provide fertile ground for discussion. He began using WebCT as a tool both for distributing informational materials and for on-line testing. In doing this, he relied on the students to read on their own time; his discussion/lecture now addresses related but different concepts in supplementing the text. Making the quizzes available online provided more opportunity for group and class discussion. Students were positive; they could find their grades, course syllabus, assignments and topic notes in one central location. Convenient, if not actually a revolution in pedagogy, but consistent, once again, with the campus culture.

Pope himself viewed the electronic interface as an opportunity to evaluate his own teaching. In any implementation of electronic technology in the classroom, a major evaluation of course objectives and teaching strategy is required, and he found the electronic tools promoted both class and online discussion. Drawbacks were a lengthy development and the availability of trained support staff.

Thurber, teaching an upper division class in English literature, has had a different experience. It was not obvious to him that the standard distance education model was appropriate, given both the mission of the university and his actual task, which was to investigate, in this case, the work of the English poet William Blake. He does not give quizzes as such, although short exercises related to that moment's discussion do take place; there is no "lecture" and therefore no lecture notes. The course itself, in addition, was already as "interactive" as he (and his students) could stand. Instead, the goal was to use the Web to investigate the nature of hypermedia, particularly as the poet in question, Blake, had done an 18th century version of the same thing. His goals, therefore, were far more specific to the actual material—more contingent, more dependent on the actual poetry than on any idea about how to teach poetry. He created a course website (www.sandiego.edu/~thurber/CyberBlake) and asked the students to create their *own* hypermedia websites in lieu of the traditional paper—the rationale being, once again, not so much that hypermedia may be worth investigating, but that, given this poet's practice, hypermedia are an appropriate, perhaps the most appropriate, response.

In creating this course, Thurber was guided by the second of two increasingly widespread implementations of what is generally referred to as distance education. The first typically involves placing the bulk of the course on the web, together with various kinds of electronic interaction. About this implementation Thurber has reservations, shared by most of his colleagues in the humanities—and indeed the College of Arts and Sciences, the largest in his university, has recently decided to deny transfer credit for undergraduate courses taken substantially online. The reasons are many, but essentially they involve basic questions—what is a course, and what do we expect our students to be able to do after taking one—to which this first distance education model returns only ambiguous answers.

The second model, however, involves a combination of traditional course and online work, "real" as well as "virtual," with variations as diverse as the instructors and institutions that choose to work this way. Here the use of technology in the classroom displaces the substitution of technology *for* the classroom, a far less vexed implementation when the issue is, as in Thurber's case, the teaching of poetry in a residential university with smallish classes. He has been guided, in particular, by the paradigm developed at Britain's Open University (http://www.open.ac.uk) which supplements online material with local study centers (and tutors) at learning centers around the world. On this model, the discussion, always specific, always local, and always the joint product of the persons present on that occasion, is preserved, together with ancillary electronic material and the opportunity, which he welcomes for his classes, for students to write back at the sea of electronic media they are surrounded by, owning the web by helping, in a small way, to create it.

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[i] Richard McCray: http://www.center.rpi.edu/pewgrant/rd1award/UCBplan.html

[ii] Bruce Wilson, Phillip Pollock, Kerstin Harmann, "Best of Both Worlds? Web-Enhanced or Traditional Instruction in American National Government." *Political Chronicle*, v. 12, no. 2, Fall 2000

A SYSTEM DESIGN FOR THE IMPLEMENTATION OF DISTANCE EDUCATION

Andres Nuñez[1]

We cannot solve the challenges of the knowledge age with the same tools we used in the industrial age. In this context, if higher education institutions want to be successful with their implementation of distance education strategies, they need to implement it using a system perspective.

The new millennium is characterized by important changes affecting all aspects of our lives. We have experienced a major societal transformation from the industrial age to the postindustrial information/knowledge age. However, we continue to think and solve problems using the mindset of the classical scientific orientation that still prevails in both educational scholarship and practice.

This way of thinking has influenced distance education and today we study distance education taking in consideration a diversity of fragmented disciplines including student support, faculty development, information technology and instructional design. This separating- into-disciplines approach can provide only partial interpretation of the system studied, and sets forth descriptions based on disparate theoretical frameworks (Banathy, 1996).

THE DISTANCE EDUCATION SYSTEM

The distance education system proposed here is composed of six main elements:

1) Planning, 2) Instructional Design, 3) Technological Implementation, 4) Academic Implementation, 5) Quality and Evaluation, and 6) Administration.

Subsystem 1: Planning

This subsystem includes two main elements: Organizational Change for the Implementation of Distance Education and Strategic Planning of Distance Education Projects

Organizational Change for Digital Education: One of the main issues in the success of campus initiatives in distance education is the support of campus leaders. These leaders must create a shared vision to involve faculty, administrators and students in the development of campus wide initiatives to support distance education. In this way the project will be able to articulate a clear educational purpose, demonstrate validity for stakeholders, and reflect the broader mission of the institution. "Both top-down and bottom-up support is needed for successful distance education." (Berge & Schrum, 1998).

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Strategic Planning: Strategic planning is the key to link all the elements involved in the implementation of a system for distance education. Through strategic planning is possible to link topics such as pedagogical changes needed for distance education, institutional and cultural issues, and organizational structure. For example, how distance education programs fit within the mission of the institution must first be determined before any major resource allocation should be expected.

Subsystem 2: Learning Theories and Instructional Design

Good instructional design is the core of any quality distance education course. It is virtually impossible to create a distance education course without knowing and understanding instructional design. The instructional design of distance education needs to be based upon sound learning theories otherwise it runs the risk of being an inappropriate use of the medium. Although there are many learning theories, two that dominate instructional design are behavioral and cognitive psychology. Higher education institutions should have clear and written statements about their instructional design and learning theories approach to distance education.

Subsystem 3: Technological Implementation

Information technology (IT) has the potential to solve many problems. It can increase access to higher education through distance and distributed learning programs, change the roles of students and faculty through interactive technologies, facilitate more learner-centered education, increase funds through improved business processes and distance education, and expand the scope and content of the curriculum (Horgan, 1998). However, information technology is just a means to an end; is a tool that has to be guided using clear objectives where learning should be the final purpose. Information technology, like any educational tool, cannot exist in isolation, but must be made an integral part of the entire system approach to distance education.

Subsystem 4: Academic Implementation

Effective teaching at a distance is more the result of preparation than innovation. The distance educator can employ a number of strategies focusing on planning, student understanding, interaction, and teaching to ensure a successfully delivered course (Barry, 1992). It is important to include faculty development programs for distance education that take into consideration incentives and reward structures and motivate instructors to develop instructionally effective distance education courses.

Subsystem 5: Quality and Evaluation

According to Lockwood (2000, p. 81) "quality assurance is a set of procedures or systems planned to ensure that an effective, efficient and satisfying experience is provided for learners". Higher education institutions should have in place quality assurance systems that include general sets of principles and standards that endeavor to get things right first time, and that can be checked regularly during the whole process.

Subsystem 6: Administration and Costs

It is not possible to implement a system for distance education without taking into account decisions about the budget, infrastructure, staffing, and policy. This type of decisions should come from both academic planners and the implementation team. Leaders championing distance education within their institution must be able to show that such programs are adding value, are relevant, and may increase enrollment and retention, and thus warrant a change in some policies (Berge & Schrum, 1998).

CONCLUSION

Armed with a systematic plan that lists goals and priorities, a financial strategy that allows for life cycle planning, a reliable and robust IT infrastructure, adequate support services, and incentives for faculty to experiment with information technology in their classes, higher education institutions will be well-positioned to use distance education effectively. Ultimately, the goal is to educate students and faculty to be able to function successfully with technology in the 21st century (Horgan, 1998).

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PROMOTING mLEARNING BY THE UniWap PROJECT WITHIN HIGHER EDUCATION

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Finnish universities are on the edge of transforming towards a symbiosis of traditional university and virtual university. The University of Helsinki established the Educational Centre for ICT in the beginning of 2000 to support university teachers in their attempts to benefit from technology in their teaching and to develop their pedagogy to use information and communication technologies for didactic purposes. One of the research and development projects that have been set up by the centre is the UniWap project. The aim of the project is to develop educational use of mobile technology and to find out pedagogical applications that are beneficial to students and faculty in the virtual university. The project deals with the WAP technology to be tested, piloted and completed in order to facilitate teaching and learning in the university. The project is a joint venture of the Helsinki University and *ICL Invia*. The mCastor technology enables the user, who may have several terminals like WAP, PC or Communicator, to use the same information service or system adapted to the actual user environment.

THE mLEARNING CONCEPT

The term 'mLearning' has lately emerged to be associated with the use of mobile technology in education. It seems, however, that it is used in commercial purposes rather than as an educational concept. We wonder if the term is a commercial trick to market technology and educational services or if it is an emerging concept that educators should take seriously. 'Just what is mobile elearning (mLearning)?', asks Clark Quinn (2000) in 'Line Zine'. His answer is: 'It's elearning through mobile computational devices: Palms, Windows CE machines, even your digital cell phone.'. Accordingly, mLearning is defined with the terms of ICT. When we try to understand mLearning from the perspective of educational theory, technology-based definition is obviously not sufficient. However, it is interesting to try to benefit from the technological perspective. What kind of words we can associate with mobile technology? First, 'portable', which means that we can carry those devices that we call mobile. Second, wireless, i.e. there are not wires in the equipment. These two aspects: 1) some device is so light that you carry it, and 2) there are not wires in the device, are not from educational point of view very interesting. In stead, we could try to find out something educationally interesting in the third aspect: 3) we are moving when using technology. In other words, the very 'mobility'. When we further consider the mobility aspect we can ask: 'Who is moving and why are they moving'? From 'why' we later get the question 'where'. Let us think about 'why', first. There are two explanations. First, the reason of moving is irrelevant regarding to learning and teaching. A person just happens to be moving while conducting educational activities. It deals with **convenience**: rational time management and other such things. In this sense, mobility does not look like interesting from the pedagogical point of view. However, it gains some pedagogical relevance when we add to the explanation that a person, a student or a teacher, is moving because it is possible for him or her to be moving and simultaneously conduct educational activities like studying and teaching. We come to this aspect later in this article. Second, we can assume that a person is on the move in some particular place or places which is/are relevant regarding to subject that is being taught or that is under the study. We may call this the perspective of **expediency**. We can also argue that the first of these two explanations is the perspective of receiver while the second is that of producer.

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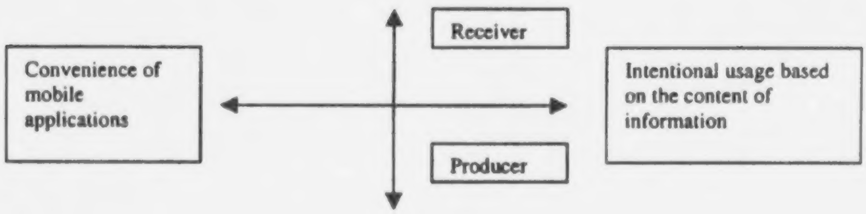
Receiver
Convenience of mobile applications
Intentional usage based on the content of information
Producer

Figure 1. The perspectives of convenience, expediency, receiver and producer.

We can also ask, who is moving? There are several possibilities. First, naturally, a student and a teacher come to our mind. Further, it may be an outside expert or, interestingly, it may also be someone or something that is the object of studying and teaching (for example, some animal in the studies of zoology). One or two of these possible parties may be moving or, perhaps, they all are in the move. At least for the student and the teacher both convenience perspective and the expediency perspective are true. Finally, we can pose the question: 'where are they moving'? Regarding to the convenience perspective, 'where' is not important. However, we can consider this perspective from the point of view of higher education concerning the relationship between university and the surrounding society. The walls of the university become permeable. Work – leisure, university – home (or, regarding to mobility, way to work/way to home) and the public – the private, blend. We may call this relationship as a convenience relationship between university and its surroundings where people carry out their activities. When regarded from the expediency perspective, the relationship between university and the entire society can be described with expressions like 'the university as a part of the society' and 'the surrounding society as a part of the university'.

THE FIRST STAGE OF THE PROJECT

At the first stage of the UniWap project, in the academic year 2000-2001, a group of university teachers were selected as a pilot mobile group to complete their in-service training. The course focuses on educational use of ICT and it is provided by the Educational Centre for ICT. The students (i.e. university teachers) conduct their studies in teams of 2 to 4 persons and the aim is to design and to realise a subtask which is related to their own teaching. Their efforts are supported by a mentor. The first group of 14 persons was established in February 2001. Nine students were provided with Nokia Communicators 9110i and the rest with Nokia 6210 WAP mobile phones. The training includes face-to-face meetings, WebCT environment and mobile studying. In addition, the pilot group has its own web pages which are mostly used for informational purposes. These different elements associate with particular forms of network-based studying, each of them supporting in their own way the subtasks that the students are working with.

According to the mentor, the benefits of mobility at this first stage have appeared as a special possibility to support the students. Between the face-to-face meetings the mentor has given instructions through technology according to the actual situation of students' subtasks. For students, the mobile technology has enabled immediate writing of short messages in order to process their learning experiences to be added in their studying portfolio. These activities have been possible even if both the mentor and the students often move between different places, including different campuses, during their work days.

CONTEXTS FOR THE MOBILE APPLICATIONS

According to the current Finnish national strategy for education, training and research in the information society, the networking society, and the economy introduce new ways of organizing education and transmitting cultural values. The production of new teaching material and the opening of new distribution channels require considerable structural and legislative reforms, the training of actors, and cooperation between the public and private sectors. The system of higher education degrees will be developed to correspond to the needs of working life and the principle of lifelong learning and lifelong guidance. This promotes also new contexts for mobile technical applications.

The students can be described as active consumers of learning opportunities. The universities are producing learning environments. There are also learners in the labor market. Thus, the contexts for mobile technical applications can be found in many settings between the universities and the labor market (Figure 2.).

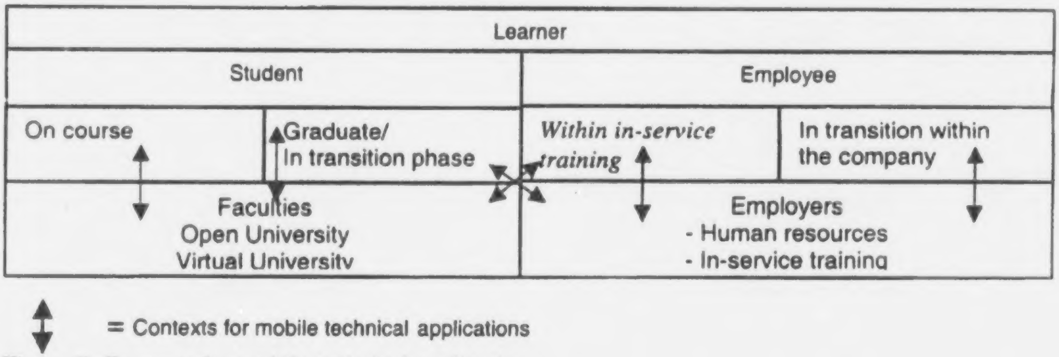
Learner
Student
Employee
On course
Graduate/
In transition phase
Within in-service training
In transition within the company
Faculties
Open University
Virtual University
Employers
- Human resources
- In-service training
= Contexts for mobile technical applications

Figure 2. Contexts for mobile technical applications

The contexts for pilot projects in university settings can be found in various situations in which information is needed for urgent decision-making or the mobility promotes high-level convenience for the user. Also, enterprises can utilize same type applications when the employees want to achieve new qualifications or new tasks within the company. The information can be related to in-service training courses at the universities or new career opportunities within the company.

CONCLUSION

The University of Helsinki began to experiment with educational use of mobile technology even as early as 1997 in the form of school network projects (Nummi et al., 1998). Today these first steps appear as a reaction to weak signals of something that in the present educational world could be called mLearning. In this article we discussed mLearning as an educational concept. Further, we have reported a current project, the UniWap, in which mobile technology is utilized and experimented with regarding to the needs of students and faculty in higher education. We also introduced some possible application contexts concerning settings between university and labour market. The UniWap project is in its first, promising stage. The practice as well as theoretical elaboration provide a challenging field for both technologists and educationalists to develop mLearning.

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WEBMASTERS TRAINING: VIRTUAL TEAMS TO MAXIMIZE COLLABORATIVE EFFORTS BETWEEN COUNTIES AND THE STATE DOE VIA CYBERSPACE

The Florida Department of Education Region V Professional Development Council (PDC) established in 1999 is comprised of and represents all adult education providers, school districts, community colleges, and community-based organizations in the Florida Department of Education's Region V (counties of Broward, Miami-Dade, Monroe and Palm Beach). Region V is comprised of the four most populated, culturally diverse, and complex educationally systems in Florida. The focus of the Region V PDC is to provide the following:

- Professional Development.
- Technical Assistance and Technology Assistance.
- Monitoring and Evaluation.
- Curriculum Development and Dissemination.
- Linkages with postsecondary educational institutions for consultation and support in adult education and family literacy.

Twenty-five percent of adults in Florida function at the lowest level of literacy. Approximately 13% of Florida's population is foreign-born. Twelve per cent of the state's population are adults of Spanish origin, making Florida the fourth largest Hispanic-populated state in the United States. The counties of Dade and Broward, both in Region V, have 67% of Florida's total Hispanic population.

Florida has the highest dropout rate in the nation. Approximately 41% of students quit before high school graduation. Nearly 85% of Florida's juvenile delinquents are illiterate. Half of the unemployed adults in Florida cannot read or write. The state of Florida has the fourth largest prison population in the nation. Approximately 76% of the inmates test below the ninth grade level. Almost 85% had not completed high school (Directory an Resource Guide, Florida Literacy Coalition, 1997). All of the above statistics suggest a high need for education and literacy services and a trained workforce to offer those services. Due to the complexity of the systems and the geographic nature of the state, special needs also exist for collaboration. This project fulfilled the developing relationship of the five regional professional development councils to provide region-wide continuous professional development that attempt to address the needs of 1,465,000 adults residing in Region V functioning at the lowest level of literacy.

The Region V PDC is comprised of a diverse categories of stakeholders including: Adult education teachers, adult education administrators, students, school districts, Indian tribes, community-based organizations, literacy groups, libraries, workforce development boards, migrant communities, businesses, homeless, community colleges, correctional institutions, adult basic education programs, GED programs, adult secondary programs, family literacy programs, and ESOL programs. The sheer exchange of information between these entities is monumental.

Dr. Valerie C. Bryan, Associate Professor, Florida Atlantic University

Project for 2000

The purpose of this project was to develop, deliver, and coordinate the educational and communication network for the PDC of Region V for the state of Florida. The project addressed the primary goal of Florida's Adult Education Program, "to promote literacy and reduce under-education among adults in Florida " through the continuous development of competent, qualified teachers and administrators.

The target populations of the project were the local education agencies (LEA) and community based organizations (CBO), and their administrators and staff members responsible for the training and development of teachers and administrators.

The following objectives were established for the Region V PDC to be carried out in cooperation with the two cooperating Support Institutes (Florida Atlantic and Florida International) and the various members and allied members of the PDC.

Measurable Objectives for Project

Work Plan # 1.

1. Create a online platform for training for webmasters using WebCT and its various online tools including the following: Bulletin board; Chat room; Online calendar; Private mail; Presentation tool with web-enhanced PowerPoint; Series of webpages of technical support information.

2. Design tutorial manuals to complement "hands on" instruction for the team of webmasters.

3. Provide comprehensive training for 20 people (webmasters) from Region V in the counties of Miami-Dade, Monroe, Broward, and Palm Beach presently responsible for computer labs or instruction in: Basic web/internet technology skills; Skills for developing and delivering video conferencing; Skills for integrating curriculum (instructional content) within web/internet systems. Create pre- and post-assessments of the technological competencies learned and use of practices learned.

4. Challenge the development of webpages and/or sites by the trained webmasters for their individual counties, LEAs or CBOs. Expand the impact of the training provided by inviting trained webmasters to in turn train five other persons at the local level.

Work Plan # 3.

1. Develop a website for Region V to provide ongoing technical and administrative service for Region V that provides the following:
    a. Overview of purpose of Region V PDC, some of its accomplishments, and the stakeholders involved in the project;
    b. Linkages to Division of Workforce Development at state level, to current retention website at state level, to other new regional PDC sites, and to newly created GED webpages as well as numerous other state, national and international resources that can aid South Florida;

   c. Collaborative linkages to LEAs, CBOs and universities and colleges in Region V;
   d. Interactive forms for ongoing needs assessment and strategic planning for Region V were placed on site;
   e. Collaborative calendar of professional development events for Region V was created.
2. Schedule telephone conferences and onsite meetings to further aid the administrative and collaborative workings of the Council and to enhance the training of how to use the webpages.

Accomplishments of the Virtual Teams through the Webmaster Training

WebCt was used to create a site to offer distance learning for the webmasters to augment the onsite training and to encourage more collaboration among the webmasters trained between training sessions. An online bulletin board with threaded discussion was used with online chats, a calendar tool, quizzing tools and a place to showcase virtual presentation. The WebCt accountability tools were used to ascertain webmaster involvement and collaboration throughout the process.

Four workshops were held addressing all of the following:

Workshop I: Creation of a basic web page, an email distribution list, internal and external links, tables and storyboards. HTML, Notepad, Netscape Composer and Microsoft FrontPage, and Inspiration were used primarily to aid the lessons for the 20 webmasters. The 20 webmasters were then provided the tools to in turn train three(3) webmasters each in their own counties.

Workshop II: Scanning of photos, scanning of documents using OCR software, using search engines to locate images and media on the Internet, import media and sound files to Microsoft FrontPage, scaling photos for ease of load, publishing of webs , and transferring of files to website. All webmasters had access to the Region V PDC website to load their own pages. This was done to increase the contributions from the local county, reduce the time to get pages up, and to increase the buy-in with the webmasters for the project.

Workshop III: Conversion of PowerPoint and Word documents to webpages and transfer of files, creation of portable document files (PDF), creation of hover buttons, forms, counters an marquees.

Workshop IV: Creation of Image Maps, simple videos, adding video to FrontPage, adding background sounds, and loading of Excel and Access documents to the web.

All webmasters created the assigned pages and created individual portfolios as demonstration of their learning and the products developed. WebCt statistics demonstrated acceptable learning levels for all participants. The number of individuala trained were reached. The Region V PDC website was enhanced and continues to serve as a training site and an information site for Region V at URL: http://www.adulteducation.fau.edu/regionv.

InterTrans - CONCEPT AND IMPLEMENTATION OF THE FIRST VIRTUAL UNIVERSITY IN YUGOSLAVIA

Veljko A. Spasiæ[1]

Abstract – INTERNET based Virtual Universities are the future of distance education, and, because being less expensive, especially important for the future of education in less developed countries. Subject of this paper are the concept and elements we have developed for the implementation of the first Virtual University in Yugoslavia. Paper describes the concept, the structure and the main functions of our *General Purpose Intelligent INTERNET Based Knowledge Transfer System*, named InterTrans(c)

Key words – **InterTrans, InterCons, InterLab, MultiMentor, Virtual University, AI, CAL**

INTRODUCTION

In approaching the Computer Assisted Learning (CAL), we have started from the assumption that there exists a natural, inherent, born given human capability for learning which is a complex one and not well understood. Over the centuries, many different systems for learning enhancement have been invented. Just to mention traditional one-to-one mentor teaching, modern mass schooling system, CAL, INTERNET based distance learning, etc.

Each of these have advantages and disadvantages, but attempt is always made to discover, simulate and stimulate natural learning. Many scientific disciplines support these efforts: cognitive physiology, pedagogy, artificial intelligence, etc.

Along this way of thinking, we made an effort to extract a couple of powerful, productive, natural learning processes, that can be formalized, implemented in software and in hardware, and placed on the INTERNET, in order to support INTERNET based knowledge transfer and INTERNET based learning. Main attempt was made to add to the potentials of INTERNET and information technology, not only to simply and trivially implement it.

Having all that in mind, we have designed, produced and tested a system aimed for *General Purpose Intelligent INTERNET Based Knowledge Transfer*, named InterTrans(c)

InterTrans(c) DESCRIPTION

InterTrans system is a fully integrated system designed for knowledge transfer over the INTERNET. It is interactive, adaptive to personal pace and preference in learning. Some of the **InterTrans** components have Artificial Intelligence properties, like automated knowledge acquisition (learning), adaptive tutoring, virtual dynamic objects with self monitoring and computerized speech, etc [Spasiæ, 1989, 1991b, 1993a, 1998b, 2000a, 2000b].

Here we only briefly describe the main concepts, building blocks and functions of the **InterTrans** system.

In the *Table 1* below (the left column), we present the **Cognitive Approach**, which describes the learning process, and (in the right column) the corresponding **InterTrans** functional implementation of that learning process.

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Ex-cathedra	↔	**Virtual multimedia course content**
Consultative learning	↔	InterCons(c) **Intelligent Virtual Consultant**
Consultative learning	↔	**Several multipurpose INTERNET connections with the real professor**
Experiment based learning	↔	InterLab(c) **Virtual Laboratory with Intelligent Tutor**
Discussion based learning	↔	**Discussion forum**
Task based learning	↔	**Seminar papers,** **Assignments,** **Library**

Other general InterTrans(c) supportive functions:
Bulletin Board, Help, News, Online Guest Book, Basic Administration ......

Table 1.

- **Virtual multimedia course content** presents integrated text, figures, sounds, possibly some media clips, and similar multimedia elements appropriate for the course lessons [Spasiæ, 1993a].
- **InterCons - Intelligent Virtual Consultant** (fully described in other papers) supports consultative learning. Consultations are based on freely formulated student questions, answers from the Virtual Consultant knowledge base, and the capability of the **InterCons** for a further knowledge acquisition [Spasiæ, 2000b].
- **Several multipurpose INTERNET connections with the real professor** are open for questions, answers, advises, transfer of seminars, announcements, forum participation, but also, for the communication between the real professor and Virtual Consultant professor.
- **InterLab - Virtual Laboratory with Intelligent Tutor** supports for the laboratory experiments with the virtual objects (mathematically modeled, or given in some other formal representation). Monitoring system and speaking tutor, support for guided discovery learning [Spasiæ, 1991b,1993a, 1998a, 2000a, 2000b].
- **Discussion forum** is implemented for discussion based learning. It represents an online forum open for students and professors.
- **Seminar papers, Assignments, Library** support task based online learning.

WHAT IS MultiMentor(c) ?

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MultiMentor is the main building block in **InterTrans** system. For each of the course, it is necessary to construct the new **MultiMentor** [Spasiæ, 2000b]. The structure of the **MultiMentor** is presented in *Table2.*

COMPONENTS OF THE VIRTUAL MULTIFUNCTIONAL MENTOR

MultiMentor(c)

	InterCons(c)	InterLab(c)
Virtual multimedia course content	**Intelligent Virtual Consultant**	**Virtual Laboratory with Intelligent Tutor**
Discussion forum		**Seminar papers, Assignments, Library**

Table 2.

Constructing **MultiMentor** for the course (using precisely defined procedures and protocols) is not an easy and direct process. On the contrary, it requires understanding of the subject matter, programing skills, and also, mathematical modeling and Artificial Intelligence knowledge [Spasiæ 1989, 1991b, 1998a, 2000a] But once it is constructed, **MultiMentor**, as the main part of the whole **InterTrans**, functions fully integrated in the INTERNET knowledge transfer system.

CONCLUSION

Currently, we are implementing **InterTrans** in building of the first **Virtual University** in Yugoslavia.

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THE IMPACT OF TEACHER SKILLS ON THE INTEGRATION OF ICT IN IRISH SCHOOLS.

Aidan Mulkeen[1]

Most developed countries have invested in the development of ICT in schools in recent years. In doing so most countries have also invested in ICT training for teachers, which is often seen as the major obstacle to progress in ICT in schools (OECD, 1999). This paper examines the investment in teacher ICT training in Ireland and seeks to measure the impact of this training both on teacher skill and on ICT integration.

Ireland has just over 4,000 schools (3,300 primary schools and 700 post primary schools) serving a population of under 4 million. A government programme known as "Schools IT 2000" began in 1998. This programme provided equipment grants to all schools, organised ICT training for teachers, provided support services and funded a number of ICT pilot projects. In partnership the national telecommunications company provided each school with free Internet access.

METHODOLOGY

This paper is based on data from two national surveys of ICT in schools. The first survey was conducted just before the start of IT2000 in 1998. The second survey was conducted 2 years later, when the equipment was in place and the initial training completed. These two surveys had very high response rates, with 98% of schools replying to the first and 86% replying to the second. The data from these two surveys is supplemented by a small scale survey conducted in 1999 based on a surveys of individual teachers in a stratified sample of schools.

OUTCOMES OF IT2000

Between 1998 and 2000 the number of computers in use in Irish schools grew by 65%. The result of these increases was that by 2000 there was one computer for every 18 pupils in primary schools and one per 13 students in post primary schools. There was a big increase in Internet connectivity too. Almost all schools had Internet access by 2000, compared to 25% in 1998.

One of the interesting effects of IT2000 was a narrowing of the gap between the best-equipped schools and those with least equipment. The schools each received a free computer and an equipment grant from the government calculated as £2,000 plus £5 per student. In addition schools designated as disadvantaged received additional funding. This formula meant that the schools with least equipment, typically the very small rural schools and the schools in disadvantaged areas, received proportionally more funding.

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IT2000 TRAINING FOR TEACHERS

The IT2000 programme provided training using a cascade model. Short courses were developed, typically of 20 hours duration, and interested teachers were trained to be trainers. These teachers then ran courses for other teachers on a part time basis. Teachers were not paid to go on the courses, but volunteered to attend in the evenings and out of school term.

The level of participation in these courses was very impressive with 74% of the teachers in the country doing an ICT course. Take up was higher in the primary schools where 83% of teachers did a course, compared with 65% of post primary teachers. These courses resulted in significant increases in the levels of skill reported by teachers. By 2000 90% of primary teachers and 73% of post primary teachers were reported to have some computer skills.

There was a marked increase in the level of access to ICT in schools. For example in 1998 50% of primary schools reported that pupils in third class made use of ICT, but by 2000 this had risen to 86%. In post primary schools 54% of students in second year had access to ICT in 1998, and this rose to 67% by 2000.

The survey showed little gender difference in terms of teachers' ICT skills. The same proportions of male and female teachers were reported to have "some computer skill" in both primary and post primary schools. More of the male teachers in primary schools had "some Internet skill", but the differences were small. Teachers' age was not recorded in the national survey, but some indication of the age pattern can be drawn from the teachers in the sample schools. In these schools the older teachers had slightly higher levels of computer skill although the differences were small.

IMPACT ON INTEGRATION

In order to explore the impact of teacher training on integration an "index of integration" was constructed. In each school every subject on the curriculum was given a score ranging from zero to 3 depending on the frequency of ICT use. The sum of these scores for all subjects provided a single numerical indicator of the level and frequency of use of ICT in the school. The average integration score was 12.6 in primary schools, and 8.3 in post primary schools.

Primary schools where no teacher had participated in training had a lower average integration score (9.8) than schools where at least one teacher had been trained. In the post primary schools a similar pattern appeared. Those schools where no teachers had been trained had an average integration score of 6.8, while those where 20 or more teachers had been trained had scores of over 9.

These figures suggest that there is some connection between training and ICT integration. However a number of other factors appear to be at least as strongly related to levels of ICT integration. Three factors that appear to be related to the level of integration are:

- Teachers in the school having done a higher degree in ICT in education.
- School having participated in a pilot project (even if not related to ICT)
- The school principal's use of email.

In primary schools where no teachers had a higher degree in ICT the average integration index was 11.9, while in those schools where one or more had a higher degree the average was 13.4. In post primary schools the same pattern emerged, with integration index rising from 7.6 for those schools with no teacher with a higher degree in ICT in education to 9.4 for those where 3 or more teachers had such a qualification.

A second key factor was participation in an ICT pilot project. As might be expected those schools that had been part of an ICT pilot had higher levels of integration than other schools. However schools that had participated in an innovative project unrelated to ICT also showed higher levels of ICT integration.

The level of ICT skill of the school principal also appeared to be related to the level of integration. School principals were not asked to indicate their level of skill, but were asked to indicate whether they used email "never", "occasionally" or "frequently". Schools where the principal made frequent use of email had higher integration scores than other schools at both primary and post primary level.

CONCLUSION

These surveys provide good news for the policy makers. IT2000 has resulted in more equipment and connectivity, high participation in training, increased teacher skill and increased usage in schools. Basic skills training is clearly an important pre-requisite for ICT integration and schools with high participation in training can be seen to have more use of ICT in teaching.

However integration requires more than simply basic skills. Other factors such as the schools' vision, leadership and readiness to change also play an important role. The survey data does not provide accurate measures of these variables, but the crude proxies available suggest that these factors play at least as great a role as teacher skills. If these are an accurate guide, future training will need to focus on building a pedagogical vision for ICT, aimed at both teachers and principals.

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A TECHNOLOGY COURSE FOR PROSPECTIVE MATHEMATICS TEACHERS

James R. Olsen

BACKGROUND

Teacher education in Illinois is currently in a period of change. All teacher education institutions are to have *standards-based* teacher preparation programs in place by the year 2003 (as apposed to the existing *course*-based programs). Under a *standards-based* program, institutions must certify that their teacher-education graduates are competent relative to performance standards. (The relevant state and national standards documents are listed in the reference section.) At Western Illinois University the Mathematics Department is presently in the pilot stages of redesigning their program. It has long been known that a single secondary teaching methods course is not sufficient to provide prospective teachers with all they need regarding teaching methodologies, the intricacies of the high school mathematics curriculum, assessment, *and* the use of technology for student learning. This has now become an acute problem, due to the increased expectations of the new standards. As part of W.I.U.'s pilot/redesign program, prospective high school mathematics teachers now take a three-course sequence: Technology in Secondary School Mathematics, Pedagogical Knowledge of Secondary School Mathematics, and The Teaching of Secondary School Mathematics. The purpose of this paper is to provide an explanation of the first of these courses, the Technology in Secondary School Mathematics course, which was taught for the second time in the fall of 2000. The content of the course will be described, followed by a section on some of the mechanics of delivering the course, and finally, some conclusions drawn from the first two offerings of the course.

COURSE CONTENT

The course has two "orthogonal" dimensions. The first is the *technology and instructional issues* dimension. The four aspects of this dimension are (a) graphics calculators, (b) computers, (c) the Internet, and (d) planning for instruction. The introductory (four to five) weeks of the course are an overview of the four aspects of the technology and instructional issues dimension. The second, orthogonal, dimension is the *content* dimension. Following the initial overview portion of the course, four content areas are investigated: (a) the teaching of function concepts, (b) geometry, (c) data collection, and (d) statistics. As each content area is considered, the four aspects of the first dimension are considered relative to the specific mathematics content area. Additional detail is provided in the two sections that follow.

Technology and Instructional Issues Dimension

The four aspects of the technology and instructional issues dimension are introduced in the beginning of the course. There are two purposes for this introduction. The first is to establish a baseline level of competence with using the

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technology. The second is to establish a structure for the balance of the course.

The basics of graphics calculator use are discussed, including menus, modes, tables, graphs, and use of the TI-GraphLink cable to the computer. The second aspect of this dimension is basics of computer use. Included here are file management, graphics, copying and pasting between different software packages, electronic spreadsheets, educational software evaluation, and MicroSoft PowerPoint. The third aspect is Internet use. Internet navigation, website evaluation, and creation of a basic webpage are covered. Finally, the fourth aspect of the technology and instructional issues dimension is planning for instruction. Publications and research on the use of technology in the classroom are reviewed. In addition, some strategies for structuring the mathematics classroom to utilize technology are introduced. For example, the one-computer classroom, a classroom set of graphics calculators, the five-computer classroom, and complete computer lab.

Content Dimension

The bulk of the course is an examination of four math topics that can be taught effectively with calculator and computer technology. Each time a topic is considered, graphics calculators, computers, the Internet, and instructional planning are considered to see how these could enhance student learning of the topic. The first topic, functions and relations, is central to mathematics, but is also complex, with many related concepts and often misunderstood by students. Dynamic software with linked representations are investigated in this course to learn ways the software can engage students and illuminate function concepts. Dynamic geometry software and Internet applets are considered for the teaching of geometry concepts. Data collection is done using calculator-based laboratories (CBL's), calculator-based rangers (CBR's), and LEGO dacta Technology Building Equipment. Data is analyzed using calculators and computers.

COURSE MECHANICS

One of the main goals of the course is to make students aware of the many resources that are available to them as future mathematics teachers. Toward this goal, one course assignment has students find four types of resources (print materials, software, Internet sites, funding sources for obtaining money to purchase technology) and type up a brief description of the resources. As is the case with many of the course assignments, these annotated resources are submitted electronically, and the instructor then compiles the information on a course website (see http://www.wiu.edu/users/mfjro1/wiu/stu/m475/for475.htm). One of the underlying principles of the course is that the course members are to share ideas (and otherwise share the workload). Other examples of this principle are the two, 10-minute presentations each student delivers, demonstrating a software package and a website, respectively. Students sign up for these presentations in advance, so that each student investigates (evaluates, and presents) a different software package from the other class members (and different websites).

Three important writing assignments of the course are papers the students write on how to use technology in the classroom. Rather than have these as typical college papers, the assignment is to write proposals to one's (future) school administration for using technology in the secondary mathematics classroom. The papers propose designs for using, (a) a "low amount" of technology (classroom set of graphics calculators, for example), (b) "medium amount" of technology (five computers in the classroom, for example), (c) "high amount" of technology. The students do compile a few "technology" lesson plans in the course. However, this is not an emphasis of the course, as this is a focus in the teaching methods course, which is the third course in the three-course sequence.

The exams in the course are primarily made up of "performance items." For example, students solve a problem using the graphics calculator or computer spreadsheet and the calculator or computer file are shown to the instructor for evaluation. In addition, some philosophical questions are asked on the exams. The final examination of the course requires students to reflect and summarize the "who, what, where, when, why, and how of technology in the mathematics classroom to help students understand mathematics." In the pilot phase of the course, students were given the final examination questions prior to the exam session. Students prepared their answers prior to the exam session and a summary discussion (and electronic compilation of information) was held at the exam session.

CONCLUSION

The first two offerings of this course (Fall 1999 and Fall 2000) have been quite successful with the students gaining much from the course. The classroom utilized in the Fall 2000 semester was found to be ideal. The room had tables in the center of the room which were used for class discussions and demonstrations by the instructor, using a projection system. Around the perimeter of the classroom are computers. This made for a smooth transition from instruction/discussion to student work on the computers. Approximately one-third of the class time was spent with the students on the computers interacting with software, linked calculators, and the Internet. The"mining" and sharing of ideas were very good in the course. The instructor and students focused on free software and java applets available on the Internet, and commonly used software (such as PowerPoint and spreadsheets), realizing that many school districts have limited funds for computer software. As described above, the course was structured around two dimensions–each with four aspects. Realistically, there was not time to address all sixteen (4x4) topics in detail. However, the format proved to be a good structure for the course. The Mathematics Department at Western Illinois University plans to continue offering the Technology in Secondary School Mathematics in the future.

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COMPUTER INNOVATION IN EDUCATION: INITIATION IN TURKEY

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INTRODUCTION

This paper describes a study of the initiation phase of computer innovation in education in Turkey. The first Computer-Aided Education (CAE) project was introduced in 1984 by the Ministry of National Education and focussed on hardware and training teachers in Basic programming. The pilot project of 1988-89 commissioned the development of courseware for 37 subjects as well as providing further training and additional hardware. The main CAE project was initiated in 1990-91 as part of the World Bank National Education Development Project, which included a program for introducing computer literacy and computer aided instruction in grade 10 of selected secondary schools. The Ministry placed approximately 6,500 computers in 396 secondary schools and trained 250 teacher trainers and 5,000 teachers. The schools were provided with courseware for 141 subjects. As part of a project funded by the European Commission, the author has conducted a study to gain an understanding of how secondary school teachers perceived computer innovation in their schools. This paper summarizes the results of the study pertaining to the initiation phase of the innovation.

THE RESEARCH

Drawing upon the work of Fullan (1991), a conceptual framework was prepared for assessing the presence of supporting conditions for successful initiation. The framework was organized around *relevance* (need for innovation, clarity, practicality, congruence, instrumentality, cost/benefit ratio), *readiness* (commitment, compatibility with culture, front-end training, materials, other change efforts, planning, coordination time, prior relevant experience, provision for debugging, skills, understanding), and *resources* (central administration support, in-service support, school administration support). The study sought to determine whether; the innovation was *relevant*, the teachers were *ready* for the innovation, and the *resources* were provided. The research methodology can be characterised as multiple case studies with school as the unit of analysis. Formal pre-structured interviews for use with teachers, coordinators and principals were designed to include the list of successful initiation features defined in the conceptual framework. The case studies were of three schools: two state schools which participated in the CAE project (Schools A, B) and one private school which had been involved in its own programmes of IT innovation (School C). School A is a selective state school while School B is a vocational school. All three schools offer instruction partly in English.

FINDINGS

Was the innovation relevant?

Need. Teachers considered computer education necessary for national progress in science and technology and for preparing children for future work. There was no need to use computers in teaching other subjects; computers were needed for "teaching about computers."

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Clarity. The aims of the innovation were not clear for the two schools involved in the CAE project. In School C, where the innovation was internally developed, the aim was to integrate computers in all subject areas.

Congruence. The innovation was generally congruent with teachers' practices and views of teaching. Teachers hoped to use computers in their teaching and expected benefits to students. It was not congruent with students' lack of time due to the requirements of the university entrance examination.

Instrumentality. The instrumentality of the externally introduced innovation was low in the schools involved in the CAE project. The ministry did not send any implementation guidelines and left the *hows* of the innovation to the schools.

Costs/Benefits. Costs included effort, time, personal resources, threat to sense of adequacy and negative effects on teaching. The benefits of using computers did not include any significant rewards. The expected benefits of computers included teaching more effectively and enhancing students' problem solving abilities. The possibility of adverse effects on students' socialisation was a concern.

Were the schools ready for the innovation?

Commitment. The teachers showed strong personal commitment towards learning about computers. All but one had participated in various training programmes during out of school hours. Some personally paid the fees for training. School administrations' commitment appeared to vary.

Compatibility with culture. Schools A and C are driven by university entrance examination while School B prepares the students for employment. Hence, the innovation was highly compatible with the culture of School B and not so with School A. School C is a private school and hence expected to provide computer literacy to its students. Many teachers in School A give private tutorials to prepare children for the university examination, and getting involved in the innovation may mean a financial loss. Teachers in School B do not face such a demand. School C's culture was conducive to the adoption of the innovation due the presence of several foreigner teachers who had brought with them various software. The school also featured an atmosphere of "cooperative interaction".

Front-end Training. In School A the coordinator and the principal had attended short courses, but "Nothing was beneficial." The coordinator of School B had attended a 1-month course and a 4-month teacher trainer course. The courses emphasized programming and did not answer the teacher's need. Some teachers participated in a nine-month training, which focussed on programming and did not "correspond to the curriculum." School C' coordinator had a degree in programming and two computer teachers had received training in programming.

Materials. The schools involved in the CAE project had a laboratory of 20 networked computers and 141 packages of courseware. School C had established two computer laboratories, but software was limited mainly to office applications.

Planning, Coordination Time. With typical course loads of 24-30 hours, lack of time was a problem in all three schools.

Prior Relevant Experience. The coordinator in School A had experience with technical equipment as a science teacher. He owned a computer and was preparing the school timetable on the computer. The coordinator of School C had strong relevant experience. The principal had been involved in computer innovation in the USA since late 1970s as a headmaster.

Provision for Debugging. There were no planned provisions for debugging in Schools A and B. There were no imperatives to use the innovation. The provincial IT coordinator was a channel for conveying feedback to the Ministry.

Skills. In school A, the coordinator used a school management package. He considered the skills of other teachers inadequate. In School B, the coordinator had some knowledge of spreadsheets and programming. Other teachers lacked skills to use computers with students alone. In School C, the coordinator is a programmer. Many teachers in the school could use the school computers.

Understanding. In Schools A and B, the teachers had developed limited understanding and awareness of the scope of the educational possibilities of the innovation and interaction with the Ministry needed for developing meaning for the innovation was limited. Teachers in School C gave an impression of having sufficient understanding of the innovation.

Were the resources provided?

Central Administration Support. In Schools A and B, support of the central administration was considered inadequate. In School C, strong financial support was received from Agency International Development.

In-service. School A had no teacher trainer; 8-10 teachers had attended a 2-week course for *implementor* teachers. The coordinator of School B attended an 8-month computer course during the weekends. He organised courses in his school for other teachers. The coordinator of School C attended a 2-week course for *implementor* teachers. That course was not satisfactory. The school ran a one-week course on word processing.

School Administration Support. In School A, the coordinator was satisfied with the support of the principal. The principal stated that they were not encouraging the teachers. In School B, the teachers felt the lack of support. School administration was helpful to the coordinator. In School C, the coordinator acknowledged the support given by the principal and the administration.

CONCLUSIONS

In spite of the front-end training, and provision of hardware and software as well as on-going in-service training support, the conditions associated with successful initiations were not fully satisfied at the schools involved in the CAE project. The externally mandated innovation with "no aims" was introduced into schools where neither the teachers nor the students had time for an extra activity and the teachers' knowledge, skills and self-confidence were not adequate. The need for using computers as teaching aids did not exit although computer education was considered necessary. The situation in the private school was congruent with the aim of expanding computer education. Various costs and returns were considered by the teachers concerning their involvement in the innovation and the cost/benefit ratio was not favourable. The outcomes of the initiation process can be characterised with "interest and happiness" toward a tool necessary for scientific and technological progress and hopes for using it in teaching as well.

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COMPUTER-BASED COGNITIVE TOOLS IN TEACHER TRAINING: THE COG-TECH APPROACH

Emrah Orhun*

INTRODUCTION

This paper describes an international collaboration for training teacher educators in using computer and information technologies in education. This initiative has been taken by the COG-TECH (Cognitive Technologies for Problem Solving and Learning) Network which aims to foster collaboration between the European and the Mediterranean countries in the field of information technologies in education. The initiative includes three projects (MED-CAMPUS Project B-359 and C-359, 1993-1995, and INCO Project 973367, 1998-2001) funded by the European Commission. The main purpose of these projects is to train teacher educators in the Mediterranean countries to use computers as effective pedagogical tools. Under the auspices of the European Commission, COG-TECH introduces teacher educators to a set of computer-based cognitive tools in international summer schools and local workshops. Applied research conducted as part of the projects have addressed issues such as the development of appropriate content for training teacher educators to use cognitive tools in teaching, the identification of the strengths and limitations of several tools for different learning situations and the factors affecting the implementation of IT innovation in education.

Cognitive tools are devices learners can use to transcend the limitations of the mind in activities of thinking, learning and problem solving (Pea 1985). Computer-based cognitive tools are believed to serve as catalysts for facilitating development of meta-cognitive awareness and generalized self-regulatory skills (Lajoie and Derry 1993). Examples of computer-based cognitive tools that have been used to support learning include Logo, microworlds, semantic nets, concept mapping, idea processors, hypermedia, knowledge-based/expert systems, Prolog and computer-supported cooperative work applications (Kommers et al. 1992). In addition to being based on a sounder epistemology, cognitive tools are also more generalisable and transferable tools which can support multiple outcomes (Jonassen 1992).

The training programmes aim to facilitate the development of the following know-how by the target group of teacher educators:

- Knowledge of a set of computer-based cognitive tools and an understanding of their potential and limitations for teaching and learning.
- Knowledge of learning theories like constructivism and their implications for teaching and learning with computer-based cognitive tools.
- Knowledge of a set of pedagogical strategies and didactic scenarios that will foster meaningful learning and development of metacognitive skills.
- Competency in using one or more computer-based cognitive tools for a range of pedagogical goals.
- Knowledge of criteria for selecting and assessing educational software.

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- Knowledge and skills sufficient to join or form networks among schools of education and primary and secondary schools using information and communication technologies.
- Awareness of the need for changes in the roles of the teachers to act more as facilitators and managers of learning, encouraging self-directed learning and co-operation, and less as transmitters of knowledge.

COG-TECH SUMMER SCHOOLS AND WORKSHOPS

The training activities of the projects include international summer schools and national follow-up workshops, which introduce the participants to a set of computer-based cognitive tools. One of the goals of the summer schools has been to train some of the participants to a level sufficient for conducting similar training in their countries. Three summer schools and six workshops entitled "Computer-Based Cognitive Tools for Teaching and Learning" have been organized since 1994 in Turkey and Jordan. Altogether 110 educationalists from 16 countries have taken part in the summer schools and 140 teachers have been trained in the workshops.

The question of which computer-based cognitive tools should be included in the training programmes has required a balance between the interests of those COG-TECH partners who have integrated computers in their teaching and the needs indicated by the partners representing Mediterranean countries. The opinion of several external experts was also taken into account in selecting the software and finalising the content of the programmes. During 1994-96, concept mapping tools, Logo, control technology, computer-mediated communications, expert systems and Prolog were included in the training programmes (Orhun et al. 1997). The software used in the teaching and learning activities included PDC ESTA expert system shell and Prolog, SemNet, Learning Tool, TextVision, Inspiration, Geomland and Logo. Control technology equipment included Lego Dacta Control Lab and Fischer-Technik materials. Computer-mediated communication activities were conducted using Netscape, Hotdog, WinPmail, IRC, Institute and Collage software. The summer schools were conducted largely through hands-on activities and project work. There were two theoretical lectures and two panels concerning epistemological and pedagogical issues and approaches to information technology in initial teacher education in the participating countries.

The evaluation of the training involved summative evaluation of the programme and assessing the usability of the tools used. The usability of the software was measured by The Software Usability Measurement Inventory (SUMI) developed by Human Factors Research Group at University College, Ireland. Usability questionnaires completed in the second week showed Netscape, Hotdog, Inspiration and Esta were all found to be reasonably usable by the participants while LEGO Logo and Prolog were less satisfactory to use. The participants increased their level of confidence in using the tools significantly at the end of the summer school. As a result of the feedback received from the participants, the training activities of year 2000 focussed on a smaller number of tools. The Summer School on Computer-Based Cognitive Tools for Teaching and Learning, held in 2000 in Turkey was organized around the following six modules with the indicated software tools:

1. Theory of computer-based cognitive tools (Interactive Physics)

2. Concept Mapping (Inspiration)
3. Expert Systems (PDC ESTA)
4. Computer-Mediated Communications (NetObjects Fusion)
5. Virtual Reality for Learning Special Topics (Cosmo Worlds)
6. Integration of ICT in Education and Didactics

The summer school started with a short introduction to project objectives and computer-based cognitive tools and introduced all of the tools during the first week. Participants started to present and discuss project ideas on the fourth day which were further elaborated on the fifth day. The overall aim of the projects was specified as to develop learning and teaching materials using a set of cognitive tools in an integrated manner. In parallel to the project work, participants were asked to form committees to address some of the issues related to the implementation of IT innovation in education and to the dissemination of the project results. On day 12 the participants presented their projects. All the projects developed web-based learning materials using the available tools (except ESTA). The committees also presented their reports on the same day.

OUTCOME OF THE SUMMER SCHOOL 2000

Participants were given several questionnaires on day 12 to collect data on their experiences with the tools (usability measures) during the school, and on their evaluation of the school. The results indicate that the participants were introduced to new concepts and tools during the summer school. After attending the summer school the participants significantly increased their level of understanding of the tools, their confidence in using the tools, as well as their confidence in designing curricula and implementing curricula using the tools. The levels of confidence reached in designing or implementing a curriculum using the tool is in general lower than the level of understanding or level of confidence in using the tool. This may indicate a need for more emphasis in the summer school on designing curriculum that embodies computer-based cognitive tools. The highest levels of understanding and confidence were achieved for Inspiration, which was followed by NetObjects Fusion. The participants indicated that they were very likely to use these two tools within the next year. The likelihood of use within the next year was significantly lower for ESTA and Interactive Physics compared to the other tools.

ACKNOWLEDGEMENTS

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A TECHNOLOGY-RICH TEACHER PREPARATION PROGRAM

Constance Pollard, Ph. D.*
Carolyn Thorsen, Ph.D.

INTRODUCTION

One of the goals of the National Educational Technology Plan (U.S. Department of Education, 2000) stipulates that "all teachers will use technology effectively to help students achieve academic standards." The report states, however, that most teachers have not been prepared to use technology effectively, that they are in essence… "out of step with what is needed to prepare the nation's students for the challenges they will face in the future" (p. 6).

The report goes on to say that "new teachers entering the profession are still not being adequately prepared to teach with technology" (p. 14), and calls for improvements in teacher preparation programs to ensure that our nation's new teachers are able to provide students with "21st-century literacy" skills. Teacher preparation programs are charged with the responsibility of preparing teachers who have the knowledge and skills to use technology for effective teaching, learning, and assessment (Secretary's Conference on Educational Technology, 2000).

To facilitate the training of new teachers in technology, the U.S. Department of Education created the Preparing Tomorrow's Teachers to Use Technology (PT3) program and provided funding for innovative technology-rich teacher preparation programs, such as the one developed jointly with Boise State University and a consortium of rural Idaho School Districts. This PT3 project, titled Building Bridges with Technology, is dedicated to the training of teachers to use technology effectively in the teaching/learning process

BUILDING BRIDGES WITH TECHNOLOGY

The overall purpose of the Building Bridges with Technology project is to assist in the implementation of an innovative teacher education program using technology as the integral component in training, collaboration, and support. The project features a model teacher education program rich in fieldwork and technology experiences. The foundation of the program is based on research identifying best practices regarding field experiences and the infusion of technology into the teaching/learning experiences of prospective teachers.

Specifically, the goals and objectives for this teacher education program are as follows:

1. Preservice teachers will be technology proficient and proactive in their use of technology for teaching and learning by the end of their teacher training program.

*Boise State University

This is accomplished through technology training in the college environment as well as through the utilization of a collaborative network of technology-proficient, master teachers at rural locations. These master teachers, Who have already been trained by Boise State University Technology Outreach Program personnel, provide guidance and expertise in the use of technology for teaching and learning. One or more structured fieldwork placements are made for preservice teachers in the classroom of a trained master teacher in technology integration. This is accomplished with the combination of on-site experiences in rural districts, along with video experiences.

2. *All faculty involved in teaching preservice education classes will be proficient in using technology to improve teaching and learning and model the use of technology in preservice education courses.*

Attainment of this goal is realized through several avenues. First, technology training and support is provided to the faculty in the College of Education and in the associated Boise State University content area departments. Additionally, technology-rich experiences are provided for university faculty in which faculty are able to observe and to collaborate with master teachers actually using technology in their K-12 classrooms. Trained university faculty model technology integration throughout the preservice experience in technology-rich computer classrooms; additionally, they provide opportunities for their students to both observe and teach using technology throughout their teacher education programs.

3. *College of Education faculty, as well as faculty across the associated Boise State University content areas, will become proactive in their use of technology through exposure to best practices and research literature relating to technology use.*

Faculty technology expertise is strengthened through participation in NCCE, ISTE, ICTE and other technology-related organizations. Faculty attend and present at conferences as well as have access to technology research publications.

4. *Through the use of technology, the teacher education program will be able to provide flexibility in offering teacher education courses online and be able to expand services to rural area districts.*

In order to accommodate instruction at the rural sites of the consortium, a number of education courses are offered and delivered through a variety of Internet, audio and video media. In this way, students are able to complete course instruction as well as participate in their rural field experiences. The rural members of the consortium are able to use these intern students to maximize the use of technology in the K-12 classrooms and recruit them as well.

5. *The implementation of a technology-rich teacher education program will result in faculty and beginning teachers who are knowledgeable in the use of technology as a means of enhancing teaching and learning and confident in their ability to integrate it.*

The end result of this project features technology-proficient faculty as well as beginning teachers entering their first year of K-12 teaching. This goal of the project provides for an overall evaluation of the effect of a technology-rich teacher education program. Data is being collected and analyzed concerning faculty and preservice teacher attitudes toward technology, the benefits and weaknesses of utilizing technology for specific teaching activities, the extent to which technology can/should be integrated into teacher education courses, strengths and weaknesses of offering online methods courses, and the best uses of technology.

6. *Boise State faculty will be active in disseminating, both statewide and nationally, the successful practices and lessons learned from the project.*

An integral component of this project is the dissemination of results to ensure that successful practices and lessons learned from the project are modeled and employed in other preservice education programs. Dissemination efforts are extensive and include presentations at the state, regional and national levels. A project website provides a rich variety of information about technology and technology-supported lessons. Compact discs have been developed for multiple grade levels and discipline areas that feature master technology teachers effectively using technology as a teaching and learning tool. These CDs will be available for distribution around the country.

CONCLUSION

Although the Building Bridges with Technology project is only in its second year, the effect on teacher preparation at Boise State University is pronounced. More than 75% of the College of Education faculty and many of the Arts and Sciences faculty have received technology training and are integrating it into instruction. Students are benefiting from technology-rich field experiences and the rural schools have opportunities to attract new teachers.

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SHOWCASING NEW TEACHERS: ELECTRONIC PORTFOLIOS

Richard R. Pollard, Ph.D.*

INTRODUCTION

The use of portfolios as a means of measuring student progress has become increasing popular in the educational arena. The Northwest Evaluation Association describes a portfolio as "a purposeful collection of student work that exhibits the student's efforts, progress, and achievements" (Paulson, Paulson, & Meyer, 1991).

Although assessment is the primary focus of most educational portfolio systems, portfolios in the business world are used primarily as a marketing medium for the job applicant. They are employed as powerful tools for showcasing the scope and quality of an individual's experience and training. A well-constructed portfolio far surpasses the traditional resume by allowing applicants to provide concrete examples of their work and evidence of their accomplishments.

The appeal of a portfolio system that plays a dual role - one of assessment and one of showcasing new teachers - is the impetus behind the development of a professional teaching portfolio for University of Idaho, Boise Center preservice teachers. The portfolio will provide assessment data which include authentic and performance-based measures; moreover, the assessments will be based on the attainment of the Idaho MOST Standards required for certification of Idaho teachers as well as other national standards.

More pertinent to the preservice teachers, however, is the ability of the final portfolio to include artifacts that showcase their accomplishments and specifically address the hiring concerns of school district administrators. As can be expected, preservice teachers are more enthusiastic about the development of a portfolio that will assist them in attaining their first teaching job.

THE ELECTRONIC OR DIGITAL PORTFOLIO

The decision to utilize electronic media to assist in the development and display of the professional teaching portfolio is an essential one. Electronic portfolios contain much the same information as traditional portfolios, but technology allows for the capture and storage of information in the form of text, graphics, audio, and video. Electronic or digital portfolios enable preservice teachers to produce a multimedia portrayal of their skills and accomplishments and move beyond the limitations of the traditional portfolio.

With electronic media, preservice teachers easily expand the scope of their portfolios to authentically demonstrate their skills and accomplishments. In addition to the ability to present multiple and varied artifacts, preservice teachers can connect those materials in meaningful ways not possible with a pen and paper method. Artifacts can include "live" examples of their work including audio and video files. The electronic portfolios, easily transported and duplicated, demonstrate the preservice teacher's technology skills - skills valued by districts hiring new teachers.

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*University of Idaho, Boise Center

THE PROFESSIONAL PORTFOLIO TEMPLATE

Although the preservice teachers will be allowed to adjust the structure of their portfolio to best meet their needs, a template will be provided that incorporates all the components necessary for teacher preparation program assessment as well as career purposes. Preservice teachers will structure their portfolios using the categories depicted in Figure 1 below.

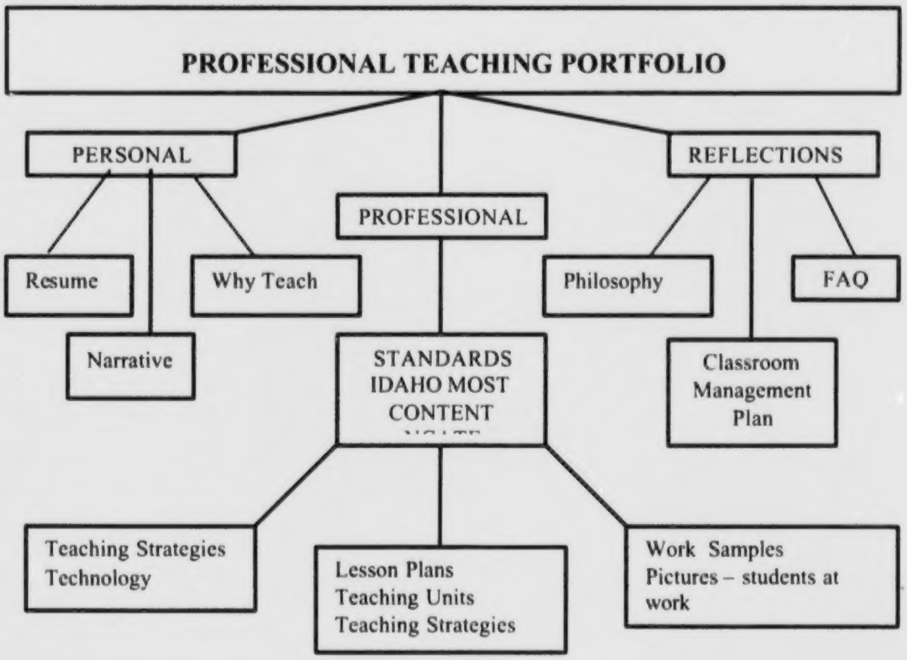
PROFESSIONAL TEACHING PORTFOLIO
PERSONAL
REFLECTIONS
PROFESSIONAL
Resume
Why Teach
Narrative
Philosophy
FAQ
Classroom Management Plan
STANDARDS
IDAHO MOST
CONTENT
Teaching Strategies
Technology
Lesson Plans
Teaching Units
Teaching Strategies
Work Samples
Pictures – students at work

Figure 1 – Professional Portfolio Template

This basic template provides all the information needed to assess preservice teachers' growth and performance in their teacher education program as well as the information school district administrators require to make hiring decisions. The following primary focus areas of the portfolio provide the structure for the preservice teachers to arrange their work:

Personal - includes the preservice teacher's resume and a statement about why he/she wants to be a teacher. Also included is a narrative (written or audio) about the student which will provide the information often asked by hiring personnel, "Tell me a little about yourself...your hobbies, etc." If the student feels comfortable about supplying a picture or video clip, this is certainly the area in which to insert one.

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Professional - for many educators, this area provides the "meat" of the portfolio. Here preservice teachers provide evidence that they have met and/or exceeded expected standards as well as their chance to highlight their K-12 students' work. With the use of electronic media, they are able to provide a wide array of artifacts including lesson plans, teaching units, and technology-supported lessons.

Reflections - our goal is for our preservice teachers to be reflective practitioners and they are encouraged to develop reflective practices throughout their teacher preparation program. This area of the portfolio allows preservice teachers to present their philosophy of education (school districts typically include this as a part of their applications). Additionally, a Frequently Asked Questions section is included in which they can respond to questions commonly asked by school district administrators when they consider hiring new teachers. Another area included in the Reflections section is the preservice teacher's Classroom Management Plan.

Although the three focus areas - Personal, Professional and Reflections - are not exclusive, they provide a structure for preservice teachers to arrange their work; by using electronic media, they can link materials that are appropriate in multiple areas. For example, preservice teachers would include their reflection logs in the Reflections Area, but will hyperlink those reflections that indicate attainment of the Idaho Most standards and/or other national standards. A reviewer of the portfolio could click on the hyperlink in a standards screen and be able to read a preservice teacher's reflection pertinent to the attainment of that standard. Similarly, the school district administrator could click on the MOST standard dealing with the development of a positive learning environment and directly access preservice teacher's classroom management plan.

CONCLUSION

The electronic Professional Teaching Portfolio provides an effective instrument for assessing the progress and growth of preservice teachers. With the guidance of university faculty, these beginning teachers are able to measure their attainment of state, national and content teaching standards. Just as importantly, through the electronic portfolio, they are able to "showcase" their accomplishments to future employers and be well prepared for the job interview.

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PORTFOLIO ASSESSMENT OF PRESERVICE TECHNOLOGY SKILLS

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Teachers' use of technology in planning and instruction is critical to the integration of technology into teaching and learning. In 72% of North Carolina's schools, at least half of teachers use a computer daily for planning and/or teaching. North Carolina currently ranks 22nd in teachers' daily use of computers. (Thompson and Cunningham, 2000).

North Carolina was among the first states in 1999 to require teaching candidates to demonstrate proficiency in technology in order to obtain initial licensure. In addition, veteran teachers and administrators are required to earn professional development credits in technology in order to qualify for re-licensure. The state mandates that 20-25% of each district's total technology budget be spent on teacher development (Education Week, 1999).

In order for teachers to use technology regularly and effectively in their classrooms, several conditions must exist. First, teachers need sufficient access to technology with adequate technical support. Second, teachers must understand the potential of technology to provide strategies for basic and advanced thinking skills. Most importantly, teachers must be trained to integrate the technology into the content they teach. Systemic change in the way teachers teach will be accomplished when this generation of preservice teachers arrives in the classroom secure in their mastery of technology.

In 1998, the North Carolina State Board of Education made a specific requirement mandating mastery of both the advanced and basic competencies. The assessment of that product would be the joint responsibility of higher education faculty and public school personnel. This mastery would be demonstrated by the preservice teacher in the form of a performance portfolio.

A portfolio is a powerful tool. Portfolio assessment requires students to collect and reflect on examples of their work, providing both an instructional component to the curriculum and offering the opportunity for authentic assessments. Portfolios, if assembled carefully, become an intersection of instruction and assessment. It is both a process and a product for helping students develop knowledge as well as a positive self-image. With guidance, the portfolio can also be used to help students plan and set effective goals and objectives.

A portfolio has been defined generally as "...a systematic and organized collection of evidence used by the teacher and student to monitor growth of the student's knowledge, skills, and attitudes in a specific subject area" (San Diego County Office of Education, 1997, p.4). The collection must include student participation in selecting contents, the criteria for selection, the criteria for judging merit, and evidence of student self-reflection.

Viewed from the perspective of classroom collaboration, teachers who embrace a "portfolio culture" in their classrooms shift their emphasis from the assessment of outcomes through comparative rankings of achievement (grades, percentile rankings, test scores) toward the enhancement of student performance through evaluative feedback and reflection. A portfolio culture supports an interactive community of learners who take responsibility for demonstrating what they know and can do (Wolf, 1995). Students revisit and revise their work. Students take pride in their work, polishing it for performance, publication and exhibition. This represents a profound shift in attitudes toward the role of evaluation in learning. The habit of testing is so ingrained in teachers that they find it difficult to understand portfolios as simultaneous teaching and assessing. Together, instruction and assessment give more than either gives separately.

Using performance assessment is like using a magnifying glass on students' learning. You see the learning clearly, but you don't disturb it (Cushman, 1999, p. 745). Portfolios capture growth over time so that students can become informed and thoughtful assessors of their own histories as learners. Portfolios yield an improved portrait of the students as learners, using a process that encourages students to become metacognitive regarding their learning. Their entire collection of artifacts and other work samples becomes a text from which they learn about themselves as learners. Cushman (1999) states that " teacher-developed portfolios might also turn an impossible array of externally imposed standards into more powerful, personal measures that they would generate from their own work and carry in their heads every day" (p. 745).

Storage and retrieval of information in portfolios, however, can be troublesome because of the volume of material assembled. Bulky items such as audio/videotapes need to be stored and retrieved. The electronic portfolio provides the simplest solution. Electronic portfolios allow the teacher to efficiently manage textual, sound, image and video information produced, refined, and collected by each student. Using an optical scanner, samples of student work can be stored and accessed by students for further refinement or presentation. Writable CD-ROMS are useful for holding large amounts of documents and images.

Several issues must be addressed before making a portfolio assignment for preservice teachers. First, determine the standards and performance indicators that the portfolio will demonstrate and the primary audience. For the North Carolina Technology Portfolio, the standards are clearly mandated by the state. Basic Competencies include: (a) Computer operation skills, (b) Setup, maintenance and troubleshooting, (c) Word Processing/Introductory desktop publishing, (d) Spreadsheet/Graphing, (e) Database, (f) Networking, (g) Telecommunications, (h) Media communications, and (i) Multimedia integration. Advanced Competencies include: (a) Curriculum, (b) Subject-specific knowledge, (c) Design and management of learning environments/resources, (d) Child development, learning and diversity, and (e) Social, legal, and ethical issues.

Equally important is the reflection piece that should accompany each artifact. This written indicator explains how the student thinks they have met the standard. For example, a classroom newsletter would meet Standard 12.3 (produce materials such as desktop publishing products to communicate information on student learning to parents). The reflection piece would elaborate on how the newsletter satisfies this requirement and the reason it was chosen over other projects. Currie (2000) surveyed a pilot group of teachers and found that the participants strongly agreed that the reflections piece was the strongest component of the process. "Reflecting will help me because I can review my portfolio and look at areas I need to improve upon" (p.34).

The artifacts themselves are the meat of the portfolio. These demonstrations should be clearly labeled, numbered and cross-referenced if the artifact meets more than one standard. The number and nature of entries need to provide a complete picture of the specific learning outcomes. The technology artifacts are geared toward demonstrating the preservice teacher's understanding of technology with a focus on implementing the technology as both a teaching and learning tool.

The portfolios should be shared with one another as well as the Technology Committee (comprised of college and school district personnel). This sharing tends to cement the commitment to learning goals. Since the preservice teacher will be required to continue their contributions to this portfolio throughout their undergraduate years (including student teaching), this commitment is critical. North Carolina is also requiring veteran teachers to continue their technology education through renewal credits. This compels the student to maintain a long-term commitment to the development of their technology skills. In this sense, the portfolio becomes a "best working portfolio".

Since the portfolio is being used as a working portfolio, the grading criteria must be carefully considered. The evidence must match the competency. There must be completeness and quality of evidence including proper citations and documentation for external sources. All artifacts must be at or above standard. A rubric is used to specify quality of performance. If a section or sections do not meet standard, the student is given three weeks before graduating to resubmit. Since this is a licensure requirement and not a graduation requirement, students may still graduate if their portfolio does not meet the criteria. However, the student would not be recommended for a North Carolina teaching license.

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COLLABORATIVE LEARNING THROUGH THE PROBLEM SOLVING DESIGN IN THE COMPUTATIONAL ENVIRONMENT – E-TEAM

Dr. Rosana Giaretta Sguerra Miskulin*

INTRODUCTION

With the introduction and spreading of Informatics in the society and in Education, we have come across a technological scenario which presents us with a new logic, a new language, a new way to understand and to place ourselves in the world we live. This new scenario requires a new professional culture from the human being going through an educational process. It has therefore, become necessary to dimension the teachers' education courses again, so as to offer them knowledge and actions which are consistent with the new educational trends, which are determined by the technological advances. In that sense, it can be inferred that we, educators, do not have much choice, that is, the educational choices have already been determined by the presence of technology in the several sectors of our society. Thus, it has become imperative that we engage ourselves in critical reflections about the introduction and spreading of computers in the classroom in order to provide our students with educational environments which are compatible with the technological development. In addition to that, we hope that these reflections can turn into concrete and real actions to contribute to teaching in a way that can live up to society's expectation.

With those perspectives in mind, a project entitled "Computational Environments in the Exploration and Construction of Mathematical Concepts in the Context of Teachers Reflective Education" is being developed at LAPEMMEC/CEMPEM/FE/UNICAMP[1] coordinated by the author. Some results of the research, inserted in the project will be presented in this communication. This research is about the several ways of using technology in the development of mathematical concepts in the classroom, in a critical and reflective way. The objectives are: 1- To offer theoretical-methodological assumptions for reflective and informed education of future teachers in the field of Mathematics Education, regarding the understanding and use of computational environments, thus helping these future teachers to develop a critical view of how technology can be incorporated and used in the context of the classroom to help in the development of mathematical concepts. 2- To offer data and pedagogical-cognitive elements to the design of interactive environments based on computational environments, Simulation, Tutorials, Problem Solving, Programming Language, AVI Constructor (Animation), Internet, among others, appropriate for the development of mathematical concepts. 3- To offer theoretical-methodological data for devising an alternative methodology based on the well informed use of technology by the teachers, thus giving a new dimension to the process of teachers education and to the process of exploration and construction of mathematical concepts.

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[1] http://www.cempem.fae.unicamp.br/lapemmec

The methodology of this research consists of a modality of action research in which the intervention takes place based on the interaction of the researcher and the subjects involved in the research. Such an interaction allows for several ways of communication, which results in a very dynamic approach. It is pointed out that the methodology that is being used with the subjects involved in the research is based on Problem Solving, in the various computational environments: Simulation, Tutorials, Programming Language, AVI Constructor (Animation), Internet, among others.

Problem solving is being seen as a design activity (Miskulin, 1999), in which the formulation and definition of the problem itself are challenging tasks for the subject, that is, s/he constructs hypotheses, suppositions; as s/he devises his/her strategies, s/he relates them to his/her objectives and to the context in which s/he is working. These are problem-situations which contain the subject's own characteristics, without ready solutions and answers, but rather with cognitive processes which take into account guesses and risk taking, that is, abductive thinking as well as deductive and inductive thinking.

The subjects in this research are undergraduate students in Mathematics at UNICAMP, undergraduate students from the College of Education, graduate students of Mathematics Education, elementary and high school teachers, and university professors. In this scientific communication, it will be presented an example of the projects developed by the subjects involved in the research, elaborated on the computational environment E-TEAM, aiming at the development of interactive contexts of collaborative learning.

E-TEAM consists of a computational environment which allows for clear and detailed electronic communication with the convenience of the use of multimedia resources. With the E-TEAM, one can carry out the following procedures: to retrieve graphs on the screen (drawings, pictures, images, graphs in general), to import images JPG, GIF, Bitmaps, texts from other programs (Word, PPT, Excel, etc), to make comments on these objects, and also to record one's voice. All these procedures are carried out at the same time, as if the user were face-to-face with somebody else explaining a certain subject. All this information is compacted and sent to the receiver, by using the e-mail program of your preference. The person who receives the file can open it and edit it and make comments about its objects in an interactive way.

The general objectives of E-TEAM can be described as follows: to create an appropriate educational context for the subjects to use the different kinds of E-TEAM files and to develop abilities to work with different formats of files and to know how to apply them to new situations. The specific objectives of E-TEAM can be described as follows: to make it possible for the subjects of the research: to interact critically with a computational tool; to apply the potentiality of this tool to pedagogical practice and to build knowledge from the interaction with the potentialities and limits that this environment offers, by using the mathematical concepts that can come up during the process of collaborative learning.

RESEARCH METHODOLOGY WITH E-TEAM

Some methodological procedures were used during the development of the research with the computational environment E-Team, such as: the use of

Tutorials, the use of Chat Rooms, aiming at the discussion of important aspects related to the subjects' projects; critical and reflective reading of selected texts related to the theme; research in websites; historical rescue of some aspects of the projects of the subjects; development of collaborative projects on topics related to the subjects' mathematical education, besides the construction of interactive messages in the E-TEAM and the exchange of these messages with other groups, always reflecting upon the mathematical concepts that came up in the individual projects.

SUBJECTS' ACTIVITIES WITH THE E-TEAM

The students were engaged in some activities – mathematical problems and challenges, giving examples of the pedagogical-cognitive possibilities of the computational environment E-TEAM, in the development and exploration of mathematical concepts. The following activity illustrates the pedagogical ability of the E-TEAM to provide an appropriate context to collaborative learning and shared knowledge.

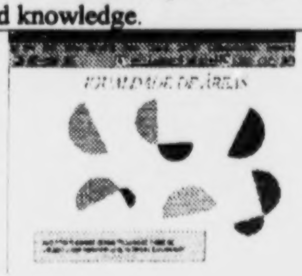

Figure 1 – Activity 1

Figure 2 – Answer to Activity 1

CONCLUSIVE ANALYSIS

The example given aims at making clear the cognitive and pedagogical possibilities of the E-TEAM as a multimedia interactive environment, which provides a favorable context for collaborative learning and shared knowledge, through electronic communication. Thus, the objectives of the research with the computational environment E-TEAM are reached as the development of an interactive educational context makes it possible for the subjects to use the different kinds of E-TEAM files in the development of mathematical problems and challenges. Another aspect emphasized is related to the fact that the subjects have shown that the critical interaction with a computational tool can give them theoretical-methodological data for the application of the pedagogical and computational potentialities of that tool to their pedagogical practice and to the construction of knowledge, which favor and contribute to a new view in Teachers' education consonant with the technological development.

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ASPECTS OF SELF-PERCEIVED COMPUTER COMPETENCE AND ITS PREDICTORS AMONG UNIVERSITY STUDENTS

Johan van Braak[1] & Katie Goeman[2]

ABSTRACT

In this paper two instruments of self-perceived computer competence are developed: 'variety of computer applications used' and 'in-depth knowledge of operating systems, word processing programs and Internet'. Two hundred and eleven undergraduate students in the social sciences responded to a self-report questionnaire. Results indicate a very high correlation between both computer competence scales. Path analysis demonstrate that 'in depth knowledge of computer applications' is dependent upon five factors: computer attitudes, computer experience expressed in time, intensity of computer use, home access to a computer and gender.

INTRODUCTION

Students must possess a wide variety of computer knowledge and skills for both academic and career success (Furst-Bowe et al., 1995; Oliver, 2000). Although university freshmen have already completed one or more basic computer courses at secondary school level, university staff are typically confronted with a wide range of computer competence. A second problem is the lack of agreement on the exact level of computer competence students should obtain during their academic study, as well as a disagreement on how this competence should be taught. Several studies reported the influence of cognitive, social, motivational and affective factors on computer competence, including computer ownership, age, computer experience, gender, computer confidence and attitudes (Campbell & Williams, 1990; Corston & Colman, 1996; Rozell & Gardner, 2000).

In this research not only the level of computer competencies among university students will be assessed but also the influencing factors will be identified. The first goal is to describe two instruments of self-perceived computer competence: the 'variety of computer applications used' and 'in-depth knowledge of basic applications'. A second objective is to identify different factors that affect the level of self-perceived computer competence. Path modeling will be used to examine the strongest predictors of the dependent computer competency variable. After the description of the results, implications of the research findings will be discussed.

METHOD

In November/December 2000, a questionnaire was administered to 211 undergraduate social sciences students. Besides socio-demographic information, the survey assessed computer experience (length of time experienced with computing); intensity of computer use (hours/week); computer attitudes; and two computer competence scales: 'diversity of computer applications used' (16 items) and 'in-depth knowledge of basic computer applications' (30 items).

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RESULTS

Descriptives

Different scores on the items of the 'Diversity of Computer Applications' instrument are presented in Table 1. Word processors, operating systems and e-mail packages are the most used applications.

Table 1. Diversity of Computer Applications Scale (n=211)

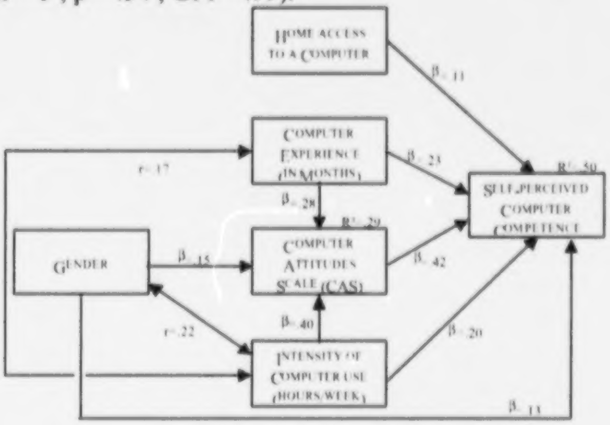
Application	% yes	Application	% yes
Word processing	97.2	Chat programs	51.7
Operating systems	95.3	Graphics	46.0
E-mail	84.8	Databases	44.5
CD-ROMs (Encyclopedia)	71.6	Specific cd-rom/dvd Software	38.9
Spreadsheets	70.6	Presentation Software	28.4
Statistical programs	64.9	Security Software	28.0
Computer Games	60.2	HTML Tools	19.9
Web browser	59.7	Telnet/FTP	14.2

Scores on the 16 items are synthesized in a 'Diversity of Computer Applications Scale (DCA-S). The mean score on the DCA-S (ranging from 0-100) is M = 54.74 (*SD* = 20.39). The second self-perceived computer competence scale was not concerned with the amount of different applications used but rather with the in-depth knowledge of three important domains of computer applications: operating systems, word processing and Web skills. Within each of the three domains, respondents were asked to indicate their knowledge with ten basic operations. Scores on the 30 items are synthesized in an 'In-depth Knowledge of Basic Computer Applications Scale (IKBCA-S), with a mean score of M = 68.90 (*SD* = 19.70) (ranging from 0-100). A relevant finding is the significant relationship between the two computer competencies measures. The intercorrelation between the DCA-S and the IKBCA-S is r=.76 (p<.001).

Path analysis

In a next step, the determinants of computer competency are explored. To this end, the IKBCA-S was used as the dependent variable. Results from a path model (Model 1) demonstrate IKBCA-S as dependent upon five factors: computer attitudes (β=.42), computer experience expressed in time (β=.23), intensity of computer use (β=.20), gender (β=.13) and home access to a computer (β=.11). The explained variance for 'in depth knowledge of computer applications' is 51 %. Three variables attribute to a 29 % explanation of the Computer Attitude Scale: intensity of computer use (β=.28), computer experience expressed in time (β=.28) and gender (β=.15).

Model 1. Determinants of Self-Perceived Computer Competence: a path model ($X^2 = 4.00$, $df = 5$, $p = .54$, $GFI = .99$).


HOME ACCESS TO A COMPUTER
β=.11
COMPUTER EXPERIENCE (IN MONTHS)
β=.23
r=.17
β=.28
R²=.29
R²=.50
SELF-PERCEIVED COMPUTER COMPETENCE
GENDER
β=.15
COMPUTER ATTITUDES SCALE (CAS)
β=.42
β=.40
r=.22
β=.20
INTENSITY OF COMPUTER USE (HOURS/WEEK)
β=.13

Discussion

The aim of the current study was to identify determinants of self-perceived computer competence. Computer attitudes were found the be strongest determinant of self-perceived computer competency. Positive attitudes toward computers in turn seemed to be mainly influenced by computer experience and intensity of computer use. The two experience measures were also found to directly impact upon computer competence. The impact of gender, both on attitudes as perceived computer competence cannot be neglected. Although the effect was found to be statistically moderate, male students tend to show more favorable attitudes toward computers as opposed to female students. Males also reported higher rates of computer competence.

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TRAINING TEACHERS FOR THE INFORMATION GENERATION

Dr. Mark Warner, Augusta State University

Jane Healy (Tell, 2000) cautions us that, "political pressures to toss computers into classrooms and to get internet connections before people even know what to do with them is an attempt to run around the teaching profession. To assume that adding a computer and software to a classroom will automatically make kids learn better is a perfect example of how little our culture understands the dynamic interaction between teacher and student" (pg. 9). How then shall today=s teachers be prepared to deliver education in tomorrow morning=s classrooms? Any response to this question is hazardous in view of the fact that technological change has increased at such an accelerating rate that proposals for pre-service and in-service teacher preparation in technology have a brief shelf life. Daunting though the task may be, one must take aim at such a dynamic, moving target and fire away.

Recently, I collaborated with our university instructional specialist to redesign a graduate level course in Instructional Technology Management.
After some careful thought, I posed the following question to the instructional specialist. How could these teachers experience the expectations they would potentially hold for their own students? More specifically, what is the most meaningful delivery system to assist teachers= acquisition of information technology techniques to foster active inquiry, collaboration, and supportive interaction in their own classroom? We determined to allow the teachers in this class to develop their own web pages to assist the enablement of their students to take responsibility for their own learning.

COURSE RELEVANCE ISSUES

As a preliminary step in assuring course quality, relevance, and teacher ownership, we conducted an on line survey. Results of the survey showed a broad range of perceived capability from novice to intermediate skill levels. No one considered herself an expert and no one knew anything about web page development or how a personal web site might be used in a classroom. However, there was a welcome, general agreement that there was not a strong correlation between their deficiencies and their perceived intelligence. They just needed some time and patient assistance.

Based on the data from the survey we gave birth to a course outline designed to provide the teachers with the skills necessary to generate exciting web pages to be used by students, other teachers in their respective schools, parents, and members of the community. A rubric was jointly constructed and negotiated with the teachers to formulate a set of criteria for the contents of each web site. Exemplary web sites were those which included opportunities for students, other teachers, parents, and members of the community to: (1) view teacher made slide show presentations including such data displays as charts, tables, and spreadsheets, (2) engage in inquiry based learning activities with external links to web sites containing primary source documents, (3) view student made projects or field trips using scanned images or digital photography, (4) read student made publications of writing using a desktop publishing format, (5) receive information regarding assignments, classroom and school wide events, field trips, classroom and school policies, and (6) engage in a wide variety of distance learning opportunities especially designed for students with extended absences. Creation of interactive asynchronous bulletin boards and calendars were optional enrichment activities for the technologically adventurous.

ONGOING OBSERVATIONS

One particular observation about the activity system of this course was the authoritative capacity of technology to enable teachers to accomplish many of the organizational, curricular, instructional, and assessment goals espoused by thousands of educators in the twentieth century. With some diligence these teachers found themselves conspicuously breathing the rhetoric of best practices for reflective practitioners. Teachers were forced to ask for guided assistance from me as well as from other more competent peers. There was an apparent endless flow of Aaha=s@ as teachers reflected on the most creative ways to engage their students given the plethora of resources that existed to supplant traditional textbook curriculum and instruction. Collaborative ideas surfaced about new and better ways to organize the classroom setting to accommodate the integration of technology. Teachers began to think about organizational and time management strategies to provide all of their students access to teachers= web sites. A pair of teachers from the same school collaborated on a web site to provide their students opportunities to experience interdisciplinary curricula. Other teachers who worked with children on the same developmental level exchanged ideas and helped each other find educational links for specific age appropriate content.

A GOOD EXAMPLE

Cindy, a 7th grade Math and Science teacher with no prior knowledge about web page construction, developed an outstanding web site to provide information for students, parents and colleagues. Her pages also included links to numerous activities designed to create a classroom environment that encourages peer discourse and collaboration, investigation, and a visual display of ideas (McLoughlin and Oliver, 1998). For example, an internal link to a page entitled "super science" offers students explicit instructions concerning their involvement in a variety of science projects. Within the context of the project there are links that provide examples of student log books, descriptions of experiments with scanned pictures of student work, and research papers. The "super science@ page also furnishes a list of external links lending ideas, inquiries, and rubrics for science fair projects. Additionally, the "super science" page contains internal links to various slide show presentations generated by Cindy to enhance the knowledge of her students.

Clearly Cindy designed her web site with a desire to enable her students to have a visible voice in her classroom. An internal link to student pages permits her students to have such a voice. One such page entitled "Matt's Blackholes" hypnotizes the viewer with a striking blinking star background superimposed with colorful planetoid images and a futuristic space ship. The page contains information on black holes and a diagram illustrating the parts of a black hole. Matt has provided a link to his e-mail address at the bottom of his page so that other students can have further discussions with him.

ADDITIONAL REQUIREMENTS

A second iteration of this course involves the addition of teacher made webquests. Webquests (Dodge, 1997) are inquiry-oriented activities in which some or all of the information with which learners interact comes from resources on the Internet. Teachers in the course are required to design long term Webquests that will typically engage the learners between one week and a month in a classroom setting. After completing a longer term WebQuest, a learner would have analyzed a body of knowledge deeply, transformed it in some way, and demonstrated an understanding of the material by creating something to which others can respond either on- or off-line. WebQuests are deliberately designed as high interest, doable tasks that make the best use of a learner's time through direct access to sources including web documents, experts available via e-mail or realtime conferencing, searchable databases on the net, and books and other documents physically available in the learner's setting.

CONCLUSIONS

Our formal and informal discussions with teachers who have completed the course reveal that they need more structured time to develop skills working with new technology based educational tools. These tools need to be presented in a context of learning in which the overall objective requires an authentic demonstration in a performance context. Teachers must be convinced by their own successes that new technological tools have an every day practical application. Teachers need more opportunities built into their daily schedules to engage in reflective thinking with other teachers to share new ideas, to revel and delight in the positive effects of their efforts measured by student progress in cognitive as well as affective outcomes, and to share new discoveries in the ever changing world of technology. Furthermore, the heart of our conversations represents a clear departure from traditional developmentalist thinking about what education should be for various age levels. Maybe younger children are quite capable of engaging in inquiry and critical thinking skills, while secondary students can revisit the enjoyment of integrating artwork and collaborative effort into real world application activities in their single subject disciplines.

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Building Assessment Mechanism into Educational Technology and Curriculum Integration

By Robert Zheng and Barbara Wilmes[*]

The increase of routine access to modern learning technologies by teachers and students has made it possible to integrate various technologies such as hypermedia and multimedia into classroom teaching. Modern learning technology has become part of the U.S. instructional landscape in formal educational settings from kindergarten through graduate school. In the meanwhile, concern regarding how to effectively integrate technology into curriculum becomes one of the primary issues in education which has caught the attention of the educational administrators, teachers, students, parents, and community. A recent study shows that while the majority teachers can use computer applications and run some educational software, their computer-based applications have little or no relevance to the curriculum objectives and instructional programs (Lohr, 2000).

Studies also indicate that what teachers are concerned most is not what particular piece of technology they learn, but rather how the technology can be effectively integrated into classroom teaching. Oftentimes efforts to integrate educational technology into curriculum fail to yield desired results. This is because such efforts are not garnered by a sound system of quality assessment. This paper will therefore address the issue of assessment in educational technology by (1) studying the pros and cons of various approaches in educational technology assessment and (2) proposing a new assessment model that focuses on various stages of designing, developing, and implementing technology and curriculum integration.

The Status Quo of Educational Technology Assessment

The educational technology assessment can be, in general, subsumed into three categories: (1) Assessment in specific content area, (2) Enhanced assessment, and (3) Assessment in authentic learning with technology. The content specific approach focuses on the assessment of the effectiveness of using technology in a specific subject area such as math, reading, ESL education, etc. Such an approach limits itself to a specific learning situation within a single subject and fails to address the issue of overall technology integration with curriculum (Dugdale, et al., 1998; Lindsay, 1999). The enhanced assessment approach zeros in on the use of technology in assessment itself, such as online testing and computer-assisted assessment. The authentic learning approach tries to study the role of technology in an authentic, constructive learning situation. For example, how can technology be used to assist problem-based learning, and how can technology be used as a tool to enhance creative, constructive learning in students? The above three approaches have contributed to the understanding of the relationship between assessment and technology. They, nonetheless, fail to address the fundamental question of assessment in technology integration: what are the common variables that are essential to technology and curriculum integration regardless of the subjects, methods, and strategies in learning?

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Bowens (2000) tried to answer this question by providing a technology integration model known as The RAC Model which consists of three phases in technology integration: Research, Analysis, and Communication. Bowens' model seems to step beyond the specific content areas to provide a more general guidance to technology integration. Yet the model has an inherent flaw that hinders it from being fully implemented in teaching and learning. It fails to provide the logical connection between the use of technology and the implementation of instructional objectives. In other words, it doesn't answer why a certain piece of technology is being used in that particular learning situation. It does not examine the functions of technology to justify its use in a particular learning situation. Morrison et al. (1999) developed a model called Integrating Technology for Inquiry (NTeQ) which examines the various stages in technology integration, including the functions and use of technology in learning. However, this model regards assessment as a separate entity. We believe that the assessment should be an ongoing process and that it must be built into every stage of technology and curriculum integration.

EEAER Assessment Model

Being aware that teachers face challenges in their use of technology and curriculum integration, and realizing that technology and curriculum integration depends on a sound system of quality assessment, we propose a model which contains five stages: (1) ***E***valuate objectives, (2) ***E***xamine technology functions, (3) ***A***ssess technology-rich activities, (4) ***E***valuate learning outcomes, and (5) ***R***eflect on learning experience. We named the assessment model as EEAER Model and it is implemented as follows:

Stage One: Evaluate objectives. The first stage focuses on setting up learning objectives and using technology to achieve the objectives. The assessment is to ensure that curriculum objectives meet the standards.

Stage Two: Examine Technology Functions. In second stage, the focus is on assessing the functions and roles of various technologies in teaching and learning. The teacher needs to assess whether the technology has met the learning needs of the students and how it can be used to fulfil the curriculum objectives.

Stage Three: Assess Technology–rich Activities. The technology-rich activities stage consists of three sub-stages: (1) *Pre-tech-rich activities*. Students identify problems, plan how to collect, analyze, and categorize data; (2*) Tech-rich activities*. Students learn to use technologies and engage in higher level thinking activities via technology; (3) *Post tech-rich activities*. This is the enrichment stage where students engage in peer review, exploring other forms of content delivery, and examine how knowledge can be transferred to another learning situation. The assessment is on how to improve students' creative and critical thinking skills, and how technology can be used as a cognitive tool to improve those skills.

Stage Four: Evaluate Learning Outcomes. The assessment will focus on four learning outcomes which we believe are critical in technology integrated teaching and learning. The four learning outcomes are: (1) Core technology skills (Coughlin & Lemke, 2000); (2) Cognitive and metacognitive skills; (3) Social skills; and (4) Attitude.

Stage Five: Reflect on Learning Experiences. Traditional classroom assessment is a one-way process in which the teacher controls the assessment. What we advocate is that the students should be involved in the assessment. In this last stage the students reflect on the use of technology in content learning, examine whether technology has helped improve their cognitive skills, and how technology can help them further to transfer the knowledge gained in this learning situation to other similar learning situations. This creates in students a sense of ownership that consequently motivates them to pursue learning at a higher level.

The EEAER model has been used in two undergraduate courses at Marian College in two semesters (Fall 2000 and Spring 2001), respectively. A course survey was conducted to students in both sessions. There was a wide range of student responses. The analysis of the data indicates that the application of EEAER model in technology integration enables students to: (1) better understand the relationship between technology and curriculum; (2) use technology more effectively to achieve their learning objectives; (3) become more goal oriented and know how to use technology as a cognitive tool to enhance their learning; (4) go beyond what technology shows to become more cognitively and meta-cognitively aware of the potential of the role of technology in teaching and learning.

Realizing that the EEAER Model has a potential for helping teachers to improve their use of technology in classrooms, we also report that the study is still in its fluid stage. It needs to be implemented in a more diverse population and learning setting so that the model can reach beyond its present study scope to generate findings that are significant at a more general level.

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MODELS FOR PRE-SERVICE AND IN-SERVICE INSTRUCTIONAL TECHNOLOGY (IT) TRAINING AT THE UNIVERSITY OF PITTSBURGH AT JOHNSTOWN (UPJ)

Bernard John Poole, MSIS and Nina R. Girard, MS[*]

From the early 1980s, with the help of the Pennsylvania Department of Education (PDE), the Education Division at the University of Pittsburgh at Johnstown (UPJ) has had an evolving program in Instructional Technology (IT) for both pre-service and in-service teachers. Two programs in particular have made this possible. From 1985 to 1995, UPJ was one of fourteen IT Education for the Commonwealth (ITEC) centers. Complementing the ITEC centers, and now the only state-funded source of IT education for in-service teachers, a series of Eisenhower Higher Education Professional Development Grants have meant that K-12 teachers in West Central PA have been able to register for University of Pittsburgh credit-bearing courses in IT. These state-funded programs, the ITEC program in particular, have been of significant benefit to our undergraduate program at UPJ which has evolved to the point where IT is now a well-integrated component of the preparation of our candidates for the teaching profession.

EVOLUTION OF THE IT PROGRAM AT UPJ

Until 1985, very little was done to provide pre-service training in educational computing. Campus computing was mostly mainframe-based, with our CS programming courses still using keypunch machines and punch cards. Then, in 1985, under the Education Division leadership of Dr. David Dunlop[•], UPJ was selected as one of fourteen IT Education for the Commonwealth (ITEC) centers. The ITEC program provided money to establish and maintain state-of-the-art computing facilities for the purpose of in-service IT training for area teachers. Graduate level ITEC courses were offered every semester. Registration was free. The program presented a major opportunity for our pre-service students to use the ITEC facilities provided by the State grant. The ITEC program was funded for ten years, and over that period of time the ITEC computer labs were repeatedly updated with the latest technology. This meant that our pre-service Education majors were kept current with state-of-the-art advances as they occurred.

But the technology courses were on the whole ill-conceived, tacked onto the Elementary and Secondary Education programs without a clear concept of their value to the program of preparation for the teaching profession. Other than teaching computer programming (BASIC and LOGO), they tended to focus on preparing Education majors for non-computer aspects of technology use in schools, such as the use of spirit masters and so forth. A second major weakness in the program was that the students were allowed to take the Ed Comm courses as early as their Freshman year. Whatever they learned then was likely to be obsolete by the time they graduated and applied for jobs in schools.

In 1996, the Education Division at UPJ was finally given the go ahead to advertise for a full time instructor in IT. Negotiations for the position resulted in

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[•] Now President of Shepherd College of the University of West Virginia three significant changes in the structure of the instructional technology program: 1) the name of the department was changed—from Ed Comm to IT; 2) the number of required IT credit hours for all Education majors was increased from 3 credits to 4; and 3) all IT courses are now Upper Level offerings. Thus the technology and related academic skills acquired in the IT courses are relatively current when the students go off to student teach.

EISENHOWER HIGHER ED PROFESSIONAL DEVELOPMENT GRANTS

Professional development of in-service teachers is important in educational reform. The continual expansion of the Internet offers enormous potential for improving education; more on-line resources allow students and teachers to have information readily available. However, it is only since 1995 that Internet connections for schools were available in West Central PA, and teachers still need training in the effective use of technology. Educators from the region served by UPJ became convinced that teachers were willing to meet challenges of educational reform. But needs assessments indicated that local teachers face several problems: 1) many do not receive any graduate level pedagogical training in mathematics, science and/or technology education, 2) most work in small, rural, and economically disadvantaged school districts, 3) small budgets make purchasing new equipment/classroom materials difficult, and 4) teachers often work in isolation, rarely exchanging ideas with colleagues. These educators reasoned that these problems could best be addressed through the creation of a regional center which would offer in-service training, an equipment loan program, and foster partnerships with local schools. It was thought that a regional center, although not a panacea, could help teachers solve some of the problems they faced. Therefore, the UPJ Center for Mathematics and Science Education (funded by the Dwight D. Eisenhower Higher Education Professional Development grant administered by PDE) was created in 1991 in cooperation with thirty school districts. The Center has since nurtured a group of in-service educators through the process of reform by providing them with professional development and the equipment/resources needed to successfully implement instructional change. The Center has been funded for approximately $200,000 per school; thus, the UPJ Center has garnered nearly $2 million over the past ten years for use by in-service and pre-service teachers, ultimately benefiting schools and students.

The primary objective of the Center is to provide sustained, high quality professional development for K-12 educators from public/private schools, with regard to the development, implementation, and evaluation of instructional strategies that reflect best practice, stress strong pedagogical components, allow teachers and students to effectively make the connection between hands-on and on-line activities, and is of sufficient intensity/duration to have a positive and lasting impact on teachers' performance in the classroom. The secondary objective is to provide services and a pool of equipment/resources which support implementation of effective instructional strategies. The Center's objectives are met through several professional development activities. These include graduate courses in IT and a series of IT workshops. The Center also provides services such as observations by staff, an extensive equipment and materials/resources loan program, and an "ask a technologist" email service. One graduate course offered yearly to 25 teachers is *Multimedia Applications & Instructional Technology in Math & Science Education.* Teachers meet for three credits hours a week for fifteen weeks of graduate level instruction and devote time to out-of-class assignments/projects. Participants develop plans for improving the quality of IT use in their schools. To date, nearly 250 teachers have taken this or a similar course. The methods used for teaching graduate courses are pedagogically sound --some lecture is necessary, but the courses "practice what we preach" and give time for hands-on discovery in state-of-the-art computing labs at UPJ. The educators learn how to appropriately use Internet resources and multimedia applications and implement teaching improvement unit plans in their classrooms. In addition, special interest workshops (three hours in length) are offered during the school year. Workshop topics range from the use of PowerPoint and Excel, to the development of web pages. Educators learn how specific applications can be used appropriately to improve teaching and learning. Ninety-five percent of those attending rated the workshops as "excellent" or "above average".

The UPJ Center has gained national recognition as an exemplary Eisenhower program for developing a vision of excellence for education. Improved teacher learning and proficiency in content has occurred with application into classrooms. Students of these teachers access the Internet and use technology frequently and appropriately. Schools benefit by teachers transferring content knowledge and skills into the classroom. Cooperating schools receive computers, peripherals and classroom materials to support their changes. Benefits to UPJ Education majors include observations of lead teachers and attendance at professional development workshops, which complement what is provided in the I.T. undergraduate program. This also provides a witnessing of local teacher implementation and interest in IT. The students are able to use materials from the equipment/loan program during field experiences and student teaching. Likewise, UPJ faculty use the materials in courses and benefit from contact with local teachers by gaining a better understanding of their needs and an awareness of the backgrounds of students entering UPJ and developing closer ties with school districts.

OUR VISION FOR EDUCATION IN AN INFORMATION AGE

Certain currently reticent understandings about teaching and learning will become the rigorous norm:

- Individualized education, including IEPs, will be the rule for all, not, as now, the exception for the privileged or disabled few.
- The teacher's influence on student learning will extend beyond the physical classroom into cyberspace, where a 24-7 learning dialog will pertain.
- Students, whether or not guided by their teachers, guardians, or parents, will roam the virtual universe in search of knowledge. They will do so most effectively if well-prepared teachers take them by the hand.
- Students will need teachers more than ever.

Based on our recent interaction with teachers worldwide, both directly and through membership of various on-line listservs, we believe that this vision is already a seminal reality that will explode into general view in the fullness of time.

MAKING IT HAPPEN FOR PRE-SERVICE TEACHERS: TWO DELIVERY METHODS OF TECHNOLOGY LITERACY

Dr. Terry Corwin*[*] & Sara Hagen**[**]

MUSIC EDUCATION

While examples of technology applications abound, "only a few music departments in colleges and universities seem prepared to provide their music majors with adequate training in computer literacy" (Deal & Taylor, 1997, p.17). The National Association of Schools of Music (NASM) accreditation agency has a standard common to all baccalaureate degrees in music that is nebulous in its intent:

> *Technology: Through study and laboratory experience, students should be made familiar with the capabilities of technology as they relate to composition, performance, analysis, teaching, and research (NASM, p. 73).*

However, the definition of technology is determined locally, with approval based upon decisions of visiting evaluators and by the NASM review commission. There are no proposed curricula nor is there a blueprint for achieving these goals. Thus, many schools are left wondering where to begin and how to organize an ever-expanding list of technology competencies.

Several issues must be considered when deciding the best method for technology literacy instruction. First, many degree programs are limited by the number of credits they can require for graduation. Some programs are being "down-sized" in order to meet the initiatives in several states to reach 120 credits per degree. Many universities cannot afford to add a separate class for technology within the specialty. Many of Deal and Taylor's (1997) survey respondents of 10 large higher education institutions offered a separate course in computer fundamentals for musicians. Only one respondent suggested that this choice may "absolve" faculty from "having to learn" technology for integration purposes. However, most felt that a separate course was the better solution for several reasons. First, without an overall plan, significant gaps or needless overlap of instruction may occur. Second, NASM reviewers may find piecemeal, haphazard application of technology unacceptable. Third, faculty may find it difficult to stay abreast of current technologies such that they can effectively apply technology in their courses. Another problem may be that the content and time commitments of music courses are already intense without having to learn computer skills simultaneously.

Survey respondents also felt that music technology should be taught in the music department—whether integrated into current curricula or as a separate course. Many universities are finding compromises, such as Florida State University, whose music school agreed to teach the basic university-required components of computer literacy within the music technology course, meeting two requirements within a single course. Therefore, every student who graduates as a music major or minor must take this course, which will be described in

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greater detail below. With the creation of Master's programs in music technology by several highly recognized music schools, such as Peabody Conservatory of the Johns Hopkins University and Indiana University Purdue University Indianapolis (IUPUI), the emerging philosophy is that music technology is a genre unique unto itself. IUPUI states "the primary objective of the program is to bring new and emerging digital arts technologies to students as they relate to a new discipline defined as music technology."

Florida State University's School of Music used the credit-sharing approach by adding a one-credit required course to be taken any time within the undergraduate program, though within the first year is highly recommended. The model includes integration beyond the one-course requirement as well. The model calls for a technology "expert" to teach the class and to assist faculty with courses and workshops in a laboratory setting. The curriculum is sectioned into four main areas. The first two sections contain university-required components. The first is basic computer skills and terminology, word processing, email, Internet searching, and basic hardware setup. The second area of evaluation and presentation is integrated into an application-based learning project in which the students evaluate music software and use PowerPoint to communicate their findings with the class in an oral presentation. The following sections are music-specific, learning the tools that they can apply to other areas of their programs. Threaded throughout the semester is a digital portfolio project in which the students create a web page that contains links to all their projects, evaluations, and any other pertinent information they wish to include (Hagen, 2001).

ELEMENTARY EDUCATION

Valley City State University has adopted an integrated technology strategy throughout its curriculum. Based on the strategies Ehrmann (1995) suggested VCSU approached the complex problem of technology integration with his perspective:

1. Technology often enables important changes in curriculum, even when it has no curricular content itself.
2. What matters most are the educational strategies for using technology, strategies that can influence the student's total course of study.
3. If such strategies emerge from independent choices made by faculty members and students, the cumulative effect can be significant and yet still remain invisible.

To assess changes in learning a university must study its educational strategies for using technologies. It is not possible to measure these strategies in a single course but it must be done across the institution or division if the evolution of the strategies is to be monitored. (p. 25)

Other educators including Steve Gilbert (1996) support this perspective and suggest it is necessary to have a density of technology use before changes in learning can be appropriately measured. Gilbert states, "To make visible improvements in learning outcomes using technology, use that technology to enable large-scale changes in the methods and resources of learning." To enable such large-scale change, nearly every course at VCSU is enhanced by a project that is based on one of the eight University Abilities (Corwin 2000); most projects involve technology. Every academic division has selected the particular Abilities its students will demonstrate with high proficiency and use to focus their senior digital portfolios.

The faculty from the Division of Education embraced this integration through project-based technology application in all of their courses. Thus the technology became imbedded in content knowledge as students applied it in authentic settings. A mapping process has been completed to determine which Abilities and what type of technology is integrated into the core courses of the Elementary major.

A student survey constructed by a member of the Division of Education is designed to obtain information related to learner centered education and the effective use of various instructional technologies. Results indicate positive perceptions from the students concerning the learner-centered use of technology at VCSU. Education faculty have only begun to explore the potential of outcome-based formative assessment using the Ability projects. The Senior Portfolios offer a summative assessment measure.

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ASSESSING THE TECHNOLOGY SKILLS AND EXPERIENCE OF ENTERING FRESHMEN FOR THE DESIGN OF THE SOPHOMORE TECHNOLOGY COURSE

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INTRODUCTION

The rapid advancement of technology results in a rapidly changing student audience. As quickly as teacher educators design curriculum to match technology standards with pre-service student instructional needs, a new freshmen class enters with a different set of skills and experience. Taking a baseline measure of the technology skills and attitudes of entering students helps faculty provide developmentally appropriate technology education. This article shares and discusses a survey method for assessing the technology skills, experience, and predisposition of 65 entering freshmen so that the sophomore media and technology course could be meaningfully designed. The skills portion of the survey is adapted from the Professional Competency Continuum (Milken Family Foundation, 2000). Results show that the entering freshmen are in the ENTRY stage of technology competency. Because we also wanted to address how our students are thinking about shaping or being shaped by educational technology, the survey additionally assessed high school experience, attitudes towards technology in the classroom, and self-perceptions of greatest technological skill. The data from Fall 2000 will be used to modify topic depth and starting points for instruction on email, visual design, role of technology, web page development, and desktop publishing.

DATA GATHERING AND ANALYSIS

Each education freshman (n=59) took the technology skills and application survey in the fall of 2000. The subjects took a shortened version of the Professional Competency Continuum Assessment Tool (Milken Family Foundation, 2000). The assessment included only those items that would pertain to a freshman pre-service teacher. Of 9 possible points on a continuum of competency, 0-3 is considered ENTERING, 4-6 is considered ADAPTATION, and 7-9 represents TRANSFORMATION.

In addition to the Milken items, the students also responded to queries about high school computer facilities and courses and to open-ended questions about their experiences with and attitudes towards technology in the classroom. The open-ended question "What is the most challenging technology-related task you have accomplished?" yielded 13 different tasks, dominated by presentation, desktop publishing and Internet software. The second open-ended question was "How should technology be used in the classroom?" The data from that question were coded into five categories: enthusiastic about use, cautious about use, uses as

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teaching supports, prevalent uses in today's and future society, and uses for new teaching methods.

RESULTS

What high school computer facilities did the Class of 2004 encounter? Over half of the respondents had some sort of high school technology courses (n=37), but the majority of those courses were keyboarding or computer literacy courses. Forty-nine students reported having computer labs in their schools; twenty-three students reported computers in all classrooms, and twenty-one reported computers in some classrooms. PC's (n=27) were reported more often than Macintoshes (n=24), and Apples still were in the schools as reported by 14 students. These numbers, however, represent the presence of these platforms, not a number of machines by platform in each respondent's high school. Only 12 students reported the presence of Macintosh computers without accompanying PC's.

Students' experiences varied widely. Students reported most experience in use of the Internet (n= 45), email (n=42), and word processing (n=42). Moderate levels of experience were reported in PowerPoint (n=29), spreadsheets (n=20) and desktop publishing (n=16). Lowest levels were reported for databases (n=9), web pages (n=8), and HyperStudio (n=5).

The students of the Class of 2004 generally scored in the ENTERING stage of the Professional Competency Continuum. Range was from .88 to 4.88. The average score was 2.63; the mode was 2, and the standard deviation was 1.56.

Analyses of the responses to the two open-ended questions yielded data in the students' own words, coded into 13 categories. PowerPoint was the dominant challenging experience for thirteen respondents, followed by seven cases of desktop publishing, six cases citing use of the Internet and four references to using the Internet as the most challenging experience. Ten other categories had 1-3 citations. The question regarding how technology should be used in the classroom yielded 5 categories. The two top categories were statements of technology's support of current teaching (n=17) and technology's dominance in today and tomorrow's society (n=17). Close behind was enthusiasm for technology (n=14) and caution about technology (n=12). Two statements were coded as new teaching methods made possible because of technology.

PROFILE OF STUDENTS IN EDUC 210 DURING 2001-2002

Always mindful of the range of abilities and experiences in any classroom, the instructor can use a profile to plan for the attributes students bring to the classroom. The table below illustrates this profile.

Table 1. Technology Profile of the 2001-2002 Sophomore in Education

High School Experience	Technology Competence	Attitude Toward Technology in Education
Most likely used PC's in a lab setting. Uses word processing, the Internet for information searching and email for communication.	Has beginner's competence in most areas of computer use, especially basic operations. Is not aware of broad range of software for either professional or personal use.	Understands that technology is pervasive and is not to be ignored. Is aware that technology can support a teacher in the classroom but is cautious about technology encroaching upon the teacher's role.

CONCLUSIONS

The International Society for Technology in Education (ISTE) has published National Education Technology Standards for Teachers (2000). The standards address six areas: technology operations and concepts; planning and designing learning environments and experiences; teaching, learning, and the curriculum; assessment and evaluation; productivity and professional practice; and social, ethical, legal, and human issues. It cannot be assumed that the ubiquitous nature of computers translates into skillful users of technology. Computer operations is still a needed topic but should have more emphasis on the attributes of technology that can be used to extend teaching possibilities. It appears that this incoming class of students is aware of technology as a tool, but they don't grasp the depth and impact that technology can have on the manner and dimensions of the learning process. At the same time, students seem invested in maintaining the status quo. The students' caution is illustrated by statements about technology assisting in the classroom but not to the point where it would not "dominate or actually teach." As technology advances, students are facing a profession that will look and act differently than the one they were taught by. Students need to examine whether their skepticism stems from fear of change or from grounded information (Albaugh, 1997). Each computer application and each demonstration of technology integration ought to coincide with an examination of the purpose of tools and the outcomes of learning.

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USING WEBSITES TO ENHANCE COMPUTER LITERACY AND CURRICULUM DEVELOPMENT

Ed Antosz

Traditionally computer literacy is seen as the mastery of skills, often from a list of computer skills deemed as necessary for success in using computers. That is, when discussing word processing skills we focus on how to cut, copy and paste. We then introduce various editing skills such as changing fonts, font sizes and styles. We might then teach about stylesheets, formatting, inserting graphics and tables. The teaching process culminates in exercises which allow the student to practice these newly acquired skills.

Although this is not an unreasonable approach, it seems to not matter which skill set is our goal, we tend to teach these skills from the same perspective. And we teach the skills from a grocery type list. The focus is on the skill and not on the process of how to use that skill.

An alternate instructional design would be to ask the student what they would like to build and then giving them the tools to do so. In this problem based approach, if the student were to identify a problem, the instructor would demonstrate the skill needed.

The end result is the same – the student learns the skills we want them to master. The process is different. The latter process is student-centered and forces the student to develop an understanding of how the tools work and not just what they do.

Rather than being the "sage on the stage" the instructor becomes the "guide on the side."

STUDENT SAMPLE

Students in a Bachelor of Education General Methodology course were used as subjects for the study. The purpose of this segment of the course was to teach computer literacy skills and skills focusing on the use of computer in the classroom. There were four sections of the course, each comprised of approximately 35 students, randomly assigned to each of the four groups. Two of these sections, with sample sizes of 36 and 37 were used for this study. One section was taught how to build a website using the traditional approach outlined above while the second group was taught using the problem based learning approach. The task for both groups was to build a curriculum and/or educational website. Each student was required to build a website. There were no restrictions on the size and content of the website. Students were not given guidelines as to how many pages should be on the site, nor were a minimum and maximum number of pages suggested. Similarly, both groups were free to design their site to include images as they preferred. Finally, both groups could design the links from page to page and to other websites as they saw fit.

The entry skills of both groups were the same. The students knew how to cut, copy, paste and save files to a floppy disk. They knew how to copy text from other files and the internet. They knew how to copy images from other files and the internet. They knew how to insert images into text documents. The teachable areas from both groups were mixed in that each group consisted of students in mathematics, science, social studies, music, French and English.

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DESIGN OF INSTRUCTION

The control group was instructed how to build webpages in AOLPress. They were shown how to enter text and format text on pages, how to save pages, how to link to other parts of the same page, how to link to other pages, how to link to other websites and how to publish their site. There was ample discussion of "how to" and numerous examples were provided. The control group was provided with the two most commonly used hierarchies for simple websites. Students in this group were free to select a topic for their website.

The experimental group was instructed to design their website by first determining the content of their site. Instruction in AOLPress was minimal. They then set out to build their pages and only returned to the instructor when they had questions about how to accomplish a specific task.

Upon completing their pages, the experimental group discussed how to link the pages together. They arrived at the two most commonly used hierarchies for the sites under construction. Although there is nothing novel in the flow charts below it is important to note that the flow charts originated from the class rather than the instructor. After deciding upon the flow from page to page, students were shown how to construct those links.

Students in both groups were provided the same task and same general instructions, only the method of presentation varied. Students were shown how to save pages to a floppy disk. The class was instructed to save all items which were to be part of the site (images, pages) to the same floppy.

The final step in the process was to publish the websites. This was accomplished by FTPing the files from each students' floppy to the university server. Although this process was technical in nature, students were walked through the FTP process. They clearly understood that this was simply another way of copying files from one location to another.

DATA COLLECTION AND ANALYSIS

Upon completion, websites were visited by data collectors who counted the number of pages on each site, the number of graphic images on each site and the number of links on each site. (Animated gifs and other visual embellishments were not counted.)

A one-way multivariate analysis of variance (MANOVA) was conducted using Group (control, experimental) as the independent variable and Pages, Images and Links as the three dependent measures. There was a main effect for Group, $F(3, 69) = 8.31$, $p < .001$. The subsequent univariate analyses revealed that all three variables were significantly different with larger scores for the experimental group (see Table 1) for Pages, $F(1,71) = 5.03$, $p < .05$, for Images, $F(1,71) = 23.64$, $p < .001$, and for Links, $F(1,71) = 13.28$, $p < .001$.

	Control		Experimental	
Group Size (n)	36		37	
	Mean	SD	Mean	SD
Number of Pages	4.28	1.03	4.92	1.38
Images per Site	7.39	1.96	11.32	4.45
Number of Links	8.72	5.40	14.95	8.76

Table 1. Means and Standard Deviations

DISCUSSION

Students in the experimental group produced more pages than those in the control group. This in part can be explained because the task of building a website originated with the students. That is to say, this group envisioned the final product and set about building it.

The experimental group also had more images on the site and more links. These may be an artifact of the first finding in that if a website has more pages than a second site it is likely that the former site will also have more images and links. However, a quick perusal of the means of this data shows clearly that this relationship, should it exist, is not linear.

The majority of sites in the control group were linked linearly while the majority in the experimental group were more hyper-dimensional. The latter were more likely to allow the user to jump to another page based on topic rather than merely to move to the next page.

The process of building the site was different for each group. The control group tended to look to the instructor for guidance on content. "Is this enough?" was a variation of a frequently asked question. The experimental group, on the other hand, tended to ask "How do I …?"

One interesting observation is that students in the control group supported each other and provided each other instruction on how to complete tasks. After showing a few students how to perform a particular task, the role of the instructor changed to that of a reinforcer, that is, students would verify that they had acquired a new skill correctly. Students appeared very comfortable providing direction to each other. Although no data was collected at this time it is interesting to speculate whether students asked more questions of each other than they might have of the instructor.

The problem based learning approach appears to be more efficient in that the instructor spent less time in formal instruction and served as a consultant to the group. At the same time this approach was also more effective. Students in the experimental group were more prolific in building their websites. They had more pages, more images and more links.

Technology In The Classrooms: New Designs for Learning

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Introduction

New learning technology implies a "new" way of learning. Yet, the reality is that much of what is taught using computers and multimedia is being done in the same "old" way. Making a paradigm shift regarding learning processes is not easy (Kahn, 1993). Conventional classroom instruction may require teachers and training developers to rethink their approach to instruction. Kahn believes there is a learning crisis in society today that is a result of how society thinks about learning. Society thinks that the stereotypic model classroom is where students sit quietly in rows listening to a teacher. Such a classroom model is proving to be wrong as well as dysfunctional. Learning, at all ages, should follow a model that more resembles real life (Kahn, 1993). In Kahn's "Seven Principles of Learning" he says that "Knowledge does not exist in an abstract, pure form, nor is it stored in the human mind in such a form. Cognitive and social processes are neither separate nor separable. Rather, people glean knowledge from observations of, and participation in, myriad situations and activities" (p.3).

Learners learn by experiences in a real world, problem-oriented approach and it is on that premise that a design for functional learning for staff, faculty, and students should become reality. Schools using technology, especially those teaching technology, should lead the way in their design and implementation as a model for other schools. The design should have more to do with how students learn, and less with hardware.

What is suggested here is that student-centered learning is favored over teacher-directed learning. This does not mean the teacher is excluded from the learning process. The teacher can act as tutor, coach, or mentor. The teacher directs the individualization and metacognitive skills to help the learner through the learning process (Atkins, 1993). Further, when students are actively engaged in the learning they are more motivated and remain engaged longer than when in a teacher-directed approach. Establishing activities through the use of technology that allow for the learner to be self-directing and problem-centered increases the likelihood of the effectiveness of the learning.

Confronting the Issues

Teachers report little or no use of computers for instruction. Despite the growing numbers of computers in the classroom and the increase in available training, teachers are still finding it difficult to use the computer as part of their classroom delivery of content. Teachers have found their time to be very valuable and scarce (Mollison, 2001). What time is not spent on lesson planning, is spent on grading, and that time not spent grading is administrative time. It is small wonder teachers can't find time to develop new or different instructional materials using technology they either don't have access to or don't know.

However, technology as a resource can help teachers cope with a growing paperwork load. Schools, businesses, and organizations have recognized that if they spend less time on record keeping and preparing materials, they can spend more time on productive endeavor (Roblyer, et. Al. 1996). Teachers can become more productive as they are trained in the use of technology and can gain quick access to information to help them and their students by meeting individual needs. Areas such as, word-processing, spreadsheets, databases, grade books, graphics, desktop publishing, online-communication, and test generation and scoring are just some of the few technology-based outcomes used to increase productivity.

Using technology can change the way teachers teach. Students need mentors with whom they can have effective dialogue. Approaches to constructive knowledge are full of alternatives. At any one time an individual may not be aware of all the alternatives. A negotiated discourse can enhance the student's capability to be a divergent thinker and more creative in nature. The teacher can play this role of a mentor and manager of this dialogue. The teacher directs the individualization and metacognitive skills to help the learner through the learning process (Atkins, 1993).

Increased communications is one of the biggest changes technology offers classroom teachers. On-line communication between teacher and student, teacher and parent, teacher and teacher, and teacher and information expands the dialog necessary to be effective. Let us not forget that teaching is still a human activity. Technology can offer considerable data, considerable of bits of information, considerable of interesting ideas, but if that information cannot be shared, discussed and used, it is lost. It is through this human interaction that ideas become creative thought and creative thought becomes a new product or service for humanity.

Helping teachers use technology effectively. Instructional Technology is a systematic way of designing, carrying out, and evaluating the total process of learning and teaching in terms of specific objectives, based on research in human learning and communication and employing a combination of human and nonhuman resources to bring about more effective instruction. Having said that what contributions has technology made to teaching and learning?

One factor is that i*nstruction can be more standardized*. One section or one class taught by several teachers can have the same thread of knowledge by using technology.

Because of the various elements of color and motion, learning can be *more interesting*. We can go places with video that would be too costly or too dangerous for our students. Yet, they can have the same vicarious experience as being there.

Though the use of computers l*earning becomes interactive*. Students can make choices and respond to those choices.

Learning time can be reduced. Much research has been done in this area. Although there still remains some questions as to specifically why time is reduced, student learn faster when using technology…and perhaps as a result the over all *quality of learning improves*. We find, for example, that teachers take care to develop high quality overhead transparencies and other materials for student use that has been fully integrated into the learning process.

Students have positive attitude toward technology. They simply like using technology. There doesn't seem to be an age restriction on these learners at all levels like using the various types of technology.

Finally, the *role of the instructor changes* from the possessor of knowledge to the facilitator of the learning environment. Teachers are free to develop instruction and to spend time with students in small groups, helping the ones who need help and enriching the ones who can absorb more.

A Conceptual Plan

According to John Hortin (1988), technology should be seen as a convenient instructional and informational delivery system for adult education. 'Technology is indefatigable, patient and objective; technology allows for individualization; and it is self-directive and interactive' (p. 217). A teacher's time is more efficiently applied through the use of technology. Technology can address the variability of learners and deliver selective, up-to-date, specialized topics. Technology today has made us reconsider instruction and identified the teacher's new role. One solution toward improving the quality of interactive courseware is to involve teachers in the development process. The solution to the confusion over which strategy to use is to develop courseware that parallels the way teachers teach. Educators need to rethink approaches that have more to do with getting students actively engaged in the learning, like simulations, where the learning grows as the students reasons through and solve each step of the puzzle.

Summary

As teachers apply technology, new ideas will develop and student's use of the technology grows. As students within both traditional and virtual 'classrooms' make greater use of the interactive power of computers (e.g. computer mediated communications the boundaries between traditional education and technology enhanced education are becoming blurred. We can see that technology continues to advance while what we are calling "traditional" instruction has yet to follow. Many classroom presentations are still in the lecture format and have not taken advantage of the available technologies. The gap will be bridged as teachers use the technology to create a student centered learning environment.

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THE PEDAGOGICAL ICT-DRIVING LICENCES

- A DANISH NATIONAL INITIATIVE TO OFFER TEACHERS TECHNOLOGY LITERACY

Øjvind Brøgger[1] *and Ulla Gjørling*[2]

The ICT in education action plan of the Danish Minister of Education states that by 2003 all Danish teachers must possess sufficient, relevant, measurable and homogenous pedagogical ICT competencies to insure a sufficient ICT integration in all subjects at all educational levels. The development of the Pedagogical ICT-driving License has helped push this development and its decentralised model has ensured local commitment while still maintaining a sufficient degree of national quality control.

The first Pedagogical ICT-driving License was School-IT in which primary and lower secondary teachers are taught ICT-integration and basic ICT skills. By March 2001 the Pedagogical ICT-driving License course has been attended by more than one third of all Danish primary and lower secondary teachers. Parallel to this success the development of a Pedagogical ICT-driving license for upper secondary teachers has taken place (HighSchool-IT). Due to the higher degree of subject orientation in upper secondary education, this ICT-driving license, while building upon the School-IT model, has a substantially higher degree of flexibility of choice for the individual teacher.

KEY OBJECTIVES OF THE PEDAGOGICAL ICT-DRIVING LICENCE

The Pedagogical ICT-driving licence must

- Substantially contribute to meet the needs for ICT-pedagogical competencies of the teachers
- Contribute to improve the pedagogical practice of the participants in relation to the integration of ICT
- Contribute to a change in methods in the work with the basic cultural techniques (reading, writing, arithmetic and the use of ICT).
- Contribute to an increased use of e-learning that meets the needs and qualifications of the individual teacher

PHILOSOPHY

One of the key objectives is to give each teacher the opportunity to take his point of departure in his working and social context. Another one of the founding principles of the pedagogical thinking of the Pedagogical ICT-driving licence is that knowledge and competencies do not arise through the transport of information from one person to another, but that learning is a result of collaborative learning through contributing, creating and acting.

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BASIC ASSUMPTIONS

- Development, process and teamwork are the key issues
- No use of ICT-tools without a pedagogical, didactic rationale
- The top and bottom 5% are always at the back of our heads when we design the course and produce the accompanying materials. It is important that the materials are both attractive for those who have begun the ICT integration in their teaching and understandable for those who have not even begun working with the computer on an individual basis.

STRUCTURE

A School-IT course offers 8 modules, which are identical for all teachers where as in HighSchool-IT the teacher follows 3 compulsory modules, 3-4 modules from a pool of 10, 1-2 subject specific modules from a pool of 32. Each module follows the same structure dealing with an overall theme that is described both from a pedagogical and an ICT-skill point of view. The structure of a module is outlined below:

1. Modul paper (compulsory)
2. Articles and case studies that focus on the pedagogical possibilities that arise from ICT integration
3. ICT exercises, the IT skills (platform independent)
4. ICT manuals (platform dependent)

Pedagogical discussions and the preparation of the paper takes place in the team where as the work with the ICT exercises and ICT manuals is individual according to the level of competence of each participant. You can say the each teacher digs into the material to the level he needs.

A web conference system supports the pedagogical debate and an online administrative system support the interaction between the instructors, the course providers, the participants and the project secretariat.

THE COURSE MODEL

The pedagogical ICT-driving licence is realised through flexible learning. The course is opened by an introductory day where teachers meet and get acquainted with each other, the course and its content and have the opportunity to discuss the objectives of the course with each other and the instructor.

The introduction also deals with the necessary technical and basic ICT skill elements that make the teacher able to continue the course after the introduction. During this introduction the teachers are divided into teams of 2-4 participants. In the School-IT model this team works together during the 8 modules, in

HighSchool-IT teachers participate in a number of different teams according to their interests and choice of modules.

The concept is based on team based competence development in which net based communication between teacher and instructor is crucial. The flexibility of the concept offers participants wide opportunity to organise the work so that it meets the needs of their everyday work as much as possible.

The course always covers 20 weeks or more; and during this period the teacher teams hand in 8 papers to the instructor. The team writes the module papers, which arise from and document the daily teaching practice of the teachers (examples of good practice using ICT in education. The instructor gives a reflective, constructive and qualifying response to the team who then rewrites the paper for final approval.

THE DISTRIBUTED COURSE ORGANISATION

Both the School-IT and the HighSchool-IT courses are offered to the teachers in a decentralised model in which the courses are realised by a number of local or regional actors in education. The course concept is described in such depth and detail that it has been possible to involve local actors in the practical aspects of the organisation of the courses. The result is that teachers do not perceive the courses as being top-down or hierarchically founded courses. They are often seen as highly local, offered to the teachers sometimes by the very school in which they are employed, sometimes offered to the teacher by the regional educational centre and sometimes by the local division of the pedagogical university.

In a distributed course organisation like this one, the quality and consistency of the concept and the accompanying material become crucial.

LOCALISATION POTENTIAL

The two basic frameworks, School-IT and HighSchool-IT have already proven flexible enough to become the basis for further localisation both nationally and internationally. The next steps that are being tested are Pedagogical ICT-driving licences for teachers in pre-school, in language centres, in nursing schools and in health schools. The next steps are driving licences for teachers in business and technical colleges. Internationally the concept has been successfully tested in Norway.

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TECHNOLOGY RICH ACTIVITIES FOR INSTRUCTION AND LEARNING WITH SUPPORT (TRAILS)

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OVERVIEW

This paper reports the development, implementation and findings of a grant funded study conducted using more than 530 5th and 6th grade students to determine if the integration of technology into the core curriculum with added training and additional school based support made a difference in student performance. The study addressed the validity and reliability of the technology assessment keyed to state technology competencies. Students were pre and post tested on the technology competencies to determine student gains. The teachers were involved in a series of inservice training events and had the advantage of an in school technical support and curriculum integration specialist. The inservice teachers completed surveys and were interviewed to determine their increases in confidence implementing technology into the core curriculum as well as the level of teacher technology knowledge and skill. The paper also reports teacher and student qualitative data regarding their reactions to the project. For more detailed information on this project please visit http://education.uncc.edu/icte.

PROJECT GOALS

This grant focused on three overall project goals. The **first goal**, "To improve the percentage of students passing the North Carolina Test of Computer Proficiency in their eighth grade year" is a long-range goal that can only be measured when the current 5th and 6th grade students take the North Carolina Test of Computer Proficiency. The current trend in student performance would indicate statistically significant gains using the locally-developed computer skills test. Detailed information regarding student pre and post performance on the locally-developed computer skills test is presented later in this document. The **second goal**, "To have Richmond County Schools Grades 5 and 6 teachers integrate technology into their day-to-day instructional program with instructional support and technology assistance". Has been met based on an examination of the school system training schedule and interviews with the teachers involved in the project. Detailed interview results are presented later in this document. The **third goal**, "To develop instructional materials that integrate computer/technology curriculum skills into the core curriculum areas for grades 5 and 6." has been met.

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TECHNOLOGY ASSESSMENT INSTRUMENT

Reliability was determined using an analysis of internal consistency of the assessment. The split-half method yielded a reliability of .83. In other words, about 83 % of the time, students did about the same on the even numbered items as they did on the odd numbered items.

The issue of validity was examined using an analysis of the instrument development process. The instrument was developed using the North Carolina Technology Competencies. Items were written to address these competencies and the process used provides evidence of Face and Content validity. Face validity asks the question, "what doe the items measure?" and the answer seems to be the assessment measures computer technology. Content validity asks the question, "what about computer technology does the assessment measure?" and the answer to this question seems to be that the assessment measures the State competencies. In addition, the locally developed test was patterned after the State Release version of the Computer Technology Assessment and the same test specifications were utilized. The item to competency match shows the relationship between the items and competencies to be in the 90% range.

To determine some additional level of content validity, faculty and graduate students conducted an analysis of the items. In an independent analysis the graduate students were 97.4% accurate in matching items to objectives.

RESULTS

For project goal #1 a comparison was conducted. The pre and post test was completed by 536 students. On the pre test the mean score was 54.05 while the mean post score was 59.26 with a mean difference of 5.20 points. A t-test of non-independent samples was conduced yielding a t value of 9.03 where $p< .001$. The gain scores ranged from -0.19 to 9.91 points with the average gain being 5.20 points.

For project goal #2 school records were examined and the teachers were interviewed using a survey. The pre surveys were given to the teachers and the results used by the system to identify areas of need and support. The post versions were not given during this cycle of the grant. It was thought that the post interviews would provide insight into the increases in confidence regarding implementation of the technology into the core curriculum.

The pre interviews compared with the post interview responses indicated the teachers were much more willing to identify specific technology skills and software knowledge. Their responses to questions 6, "What have you taken back to your classroom to use for instruction form the workshops and/or training sessions?" and question 7, "Which of your technology skills have improved as a result of the grant workshops and/or training?" were much more detailed and specific.

For project goal #3 an analysis of the quality and quantity of integrated instructional lesson plans, instructional units, and teacher resources was documented using project records. The project produced almost twice as many lesson plans as planned. The interviews surveys also documented the utility of the several lesson plans listed. These plans were made available to all of the teachers involved in the grant project. The materials included the following integrated units: (1) Weather, (2) Multiplying Integers, (3) Geometry, (4) Story Analysis, (5) Character Analysis, (6) Descriptive Writing (A public place where people gather), (7) Central & South America Poster, (8) What State Am I?, (9) Country Brochure, (10) Animal Classification Research, (11) Solar System Database Mysteries, (12) Living Things Spreadsheet, (13) Drugs, (14) State Report Brainstorming, (15) Comparing European Countries, (16) Paint A Picture, (17) Vocabulary Memory Game, (18) Multimedia Book.

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TEACHING GEOMETRY USING WEBQUEST

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Abstract

The purpose of this current study was to investigate the use of WebQuest in teaching and learning geometry with 19-pre-service mathematics teachers. For this study the researchers assigned students to one of four groups with no more than 5 students in a group. All groups were assigned to create a WebQuest regarding triangles or quadrilaterals and suitable for 7th graders. All group members contributed to the WebQuest. After the process of creating WebQuests, the researchers interviewed with randomly selected persons from each group to obtain additional data on the use of WebQuest in teaching geometry. This presentation summarizes and analyzes the findings.

Introduction

The examination and understanding of the influences of learning theories on curriculum is a goal of the mathematics education teacher preparation program at Florida State University. In addition, preservice teachers are expected to be competent in the use of technology for teaching and learning.

Recent curricular developments in geometry have been based on the van Hiele model. Students were asked to use this model as a construct for organizing and presenting a geometric topic in their WebQuest. The study looks at how pre-service teachers' understanding of teaching geometry is influenced by this instructional activity, which uses technology.

Background

Many teaching and learning theories and models have been proposed, developed and implemented for more than fifty years in order to enhance teaching and learning of mathematics. The van Hiele model in geometry was theorized by Pierre Van Hiele and his wife, Dina van Hiele Geldof, in 1957. Both mathematicians described the theory for five levels of understanding which are visualization (level-I), analysis (level-II), ordering (level-III), deductive reasoning (level-IV) and rigor (level-V) (Mason, 1998). In addition, the van Hieles (as cited in Mayberry, 1983) proposed that movement from one level to the next level includes five phases: information, guided orientation, explication, free orientation, and integration.

Even though this model and other educational theories help teachers and students, it seems at times that the model is insufficient when applied to curriculum. Examining curriculum development based on these theories or models and which uses technology should expand our knowledge of the teaching and learning process. In particular, the use of computers with well-prepared educational materials not only in teaching and learning geometry, but also in other areas, arts and sciences, would enhance teachers' teaching and students' learning. This is evidenced by a recent increase in every discipline trying to adapt the use of computer somehow because everybody would like to benefit from its advantages. It is clear that the Internet has a great influence on both students and teachers. Although it has a lot of valuable information, it is also full of useless information on webs. The misuse of Internet or websites concerns parents, educators, administrators, teachers and others (Yoder, 1999 & March, 1998). One fast emerging use of the Internet is web-based activities. This study examines the development of geometric thinking in the process of developing a WebQuest.

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What is WebQuest? It is a new computer-based learning and teaching model in which learners are actively involved in an activity or situation, and use the Internet as a resource. Today, it has been prominent in many educational areas and has received considerable attention from teachers and educators since it was proposed and developed by Dodge and March (1997). Dodge (1995) defined two types of WebQuest, short and long terms. According to him, the instructional goal of a short term WebQuest is the acquisition and integration of knowledge. At the end of a short term WebQuest, a learner will have gained a significant amount of new information and made sense of it. A short term WebQuest should be completed in one to three class periods. However, the instructional goal of a long term WebQuest is to extend and refine the knowledge. After completing a long term WebQuest, a learner would have examined a body of knowledge, transformed it in some way, and showed an understanding of the material or gained knowledge by creating something that others can respond to, on- or off-line. A long term WebQuest should be completed between one week and a month in a classroom setting. Both Dodge and March (1995) pointed out the critical attributes of the WebQuest. They defined these critical attributes as the following, introduction, task, process, resource, evaluation and conclusion (Dodge 1997; March, 1998; Kelly 2000;Yoder, 1999).

In short, today's students spend most of their time surfing the Internet. It is said that the Internet is a super information highway. So, how do researchers, educators and teachers utilize the Internet for educational purposes? We have to find a solution which has to be suitable for both parents' and teachers' expectations. A solution is WebQuest that relies on computer-based teaching. In this model students are learning by themselves on the Internet. The role of a teacher is to prepare his/her lesson on a website and give clear instructions with reliable links for his/her students. The role of students is to follow given instruction on the website and do the tasks by themselves responding to the expectation of teachers, which requires higher-order–thinking from the students.

Methodology

19 pre-service secondary and middle school mathematics teachers were divided into four groups. The researcher introduced web-page editors, such as Microsoft FrontPage, Netscape Editor and Adobe Page Mill, explained the components of a good WebQuest and showed students how to create one. Each member of a group chose different tasks in their projects. This allowed one to contribute to the groups' WebQuests. After the process of creating WebQuests, groups presented their WebQuests. Both researchers surveyed the class and interviewed each groups' presenter. Data were collected, analyzed and a summary provided below.

Analysis and Conclusion

A goal of the teacher preparation program is to help students learn about appropriate uses of technology in teaching mathematics. The activity developing a short-term WebQuests by preservice mathematics education majors appears to be a meaningful way to encourage them to consider alternatives to traditional teaching. All groups provided positive responses to wanting to use WebQuest as a break from the textbook and traditional way of teaching. They felt that this environment allowed students to apply geometric concepts in real-life applications using technology. Projects included applications to solving problems related to topics, such as the Bermuda triangle, sports, and music. The use of a WebQuest provides K-12 students with appropriate educational uses of the Internet. WebQuests also provide a context for students to engage in group work. Limitations in using WebQuests include the possibility of lack of access to the Internet, the time spent by the teacher to develop a WebQuest, and finding reliable links for resources in the WebQuest.

In conclusion, there is support to encourage the further study of the use of WebQuest in teacher preparation programs. WebQuests, when done, can be meaningful teaching strategies that utilize student use of technology in the classroom.

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COLLABORATIVE TECHNOLOGY-RICH FIELD EXPERIENCES

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INTRODUCTION

A number of factors came together three years ago to influence preservice teacher education at Boise State University. First, an existing consortium of Idaho School Districts and Boise State University, dedicated to the training of teachers to use technology effectively in the teaching/learning process, was enhanced by a PT3 grant, one purpose of which was to extend the technology training from inservice teachers to preservice teachers. Second, a renewal of the teacher certification program focused on enhancing field experiences for both elementary and secondary teacher certification candidates. Finally, weaknesses in the existing technology education program were identified and solutions proposed through the PT3 grant. Among these weaknesses was the lack of fieldwork experience for most pre-service teachers.

METHODS

The plan was developed wherein rural school districts would partner with Boise State University preservice teachers enrolled in two courses relevant to technology integration in teaching and learning: the three-credit Educational Technology, Classroom Applications, and the one-credit Field Work class. Preservice teachers would be screened for selection through an interview and application process which would also give them an opportunity to state a preference for the school district in which they wanted to work. Through the PT3 grant, preservice teachers selected for the project would receive a scholarship, travel expenses and course credit if they fulfilled the Field Work course requirements. The requirements included: a) making a minimum of three trips to the classroom of the assigned K-12 master teacher, observing technology supported lessons and collecting technology information. Preservice teachers were to spend approximately 10 hours observing or assisting in technology supported lessons and approximately 10 hours preparing and presenting projects and observations to their Field Work class for a total of 20 hours; b) participating in technology-supported lessons in the classroom of the assigned master teacher. c) arranging time with the Field Work instructor to report to the Field Work class about their field experiences; d) choosing and preparing two of the projects listed on the Field Work syllabus by the end of the semester; e) arranging time with the Field Work instructor to share their completed projects.

Preservice teachers were to interview their master teacher using a prepared set of interview questions. Those questions touched on course curriculum and the fit of the project students were working on with the curriculum, equipment being used for the project, and adjustments, if any, made to teaching style to make technology an integral part of the classroom.

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RESULTS AND DISCUSSION

These results are for one semester of the program, the first of its existence. During this time, eight preservice teachers were engaged in the Field Work class and experience. Five of the preservice teachers were in elementary school classrooms and three were in secondary school classrooms (N=8). At the conclusion of the semester, they were asked to complete two reflective evaluations, a quantitative one indicating ways in which they observed the master teacher using technology in the classroom, and a qualitative one in which they responded to questions asked about their experience. For the quantitative reflection, the categories of master teacher (N=8) use of technology were as follows: 100% used technology to organize and store information; 88% used technology to collect data and perform measurements, to plan, draft, proofread, revise, and/or publish written text, to create graphics or visual of non-data products, and to gather information from a variety of sources; 75% used technology to manipulate/analyze/interpret data, to communicate information, to create visual presentations, to support individualized learning, and to facilitate understanding of a concept; 63% used technology to create visual displays of data/information, to create models or simulations, to remediate basic skills, and to deliver instruction; 50% used technology to perform calculations, and to communicate with others, and 13% used technology to compensate for a disability or limitation. Though the eight categories surveyed do not represent all the possible uses of technology integration in an elementary or secondary classroom, they do represent more than the preservice teachers typically see in a college classroom, thereby greatly enriching their preservice experience, and planting the seeds for their own use of successful technology integration into their future classrooms. .

In the qualitative survey results, growth was noted in areas of preservice teacher understanding of the role of technology integration in the classroom. The first question asked of the preservice teachers was "Which technology supported lessons do you feel were most effective? Why?" Responses included: "The spreadsheet they made with information they gathered about the Olympics and the brochure they made with Publisher. I feel they were most effective because they were the projects the children were most excited about. Their success motivates them to do more." Another preservice teacher responded: "…a research project on wolves. My master teacher created a PowerPoint presentation that the students had to go through and get information. They had many worksheets, etc., to get information from the computer and finalized it with a research paper. It was very effective."

Another question asked of the preservice teachers was: "In your observations, what were the most effective strategies for managing the classroom during the technology-supported lessons? Tell why you feel they were effective."

One student responded: " Bottom line -- my master teacher had her students very well trained. They rarely ever misbehaved and always used quiet voices, if any at all. Whey they did get loud, the teacher would make them return to their seats and do assignments they would rather not be doing so they usually behaved." A second student responded: "That all students understood that 'their time' was coming and that each person would have equal opportunity to use the computer. In addition, all students were busy."

A third question posed to the preservice teachers was: "What did you learn about teaching and learning with technology as a result of your observations?" One preservice teacher responded: "That the computer lab where all students have hands on opportunity is a valuable tool to use in teaching/integrating technology, if the lab teacher is competent and/or the classroom teacher is involved in what goes on." A second preservice teacher wrote: "That the two an be integrated successfully. That my uneasiness with computers should not let me hinder that curiosity."

A final question had to do with the strengths of the field work experience. One preservice teacher answered: "The strengths were actually being able to have actual classroom experience. This was the most valuable thing. Also it was neat to see examples of how to integrate technology into the classroom. Another preservice teacher wrote: "I felt that the experience made my class (Educational Technology - Classroom Applications) more relevant to my job as a teacher... the opportunity to do projects and interact with a real classroom." A third preservice teacher wrote: "I am so full of ideas for how to use technology as a teacher. Thank you!" And finally, a preservice teacher responded: "The strengths of the field work experience are the contacts I have in the education field. I now know many people I can contact with questions or for various other reasons. The teaching style used with technology was also very helpful."

The preservice teachers involved in the Field Work class developed media presentations of their work, sharing the field experience with those class members not involved in the project. They were able to bring the student perspective and experience to their peers in a way not done before in the Educational Technology - Classroom Integration class.

The Boise State University faculty and the school district faculty involved in this field work project noted that their goals had been met as a result of the quantitative and qualitative reflections and interviews of the preservice teachers. These goals included: preservice teachers experiencing technology integration in a real time setting, K-12 teachers and students having an opportunity to collaborate with the college students, other preservice teachers not directly involved in field work being able to share the experience through presentations of the work accomplished by the field work students, and the rural school districts had access to future teachers whom they could consider recruiting.

Technology Supported Learning: New Models for Creating Technology Literate Teachers

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Abstract

The media's attention on our nation's dependence on computer technology has no greater evidence than the impact of technology on our nation's schools. Schools are spending more money on acquiring computing hardware than on training teachers to integrate technology into everyday classroom lessons. Research has shown that learning will be transformed in classrooms to the extent that teachers become comfortable with using technology as a cognitive tool. As future teachers move through schools of education, technology must be viewed as both an educational delivery method and an instructional communication tool.

Quality teaching in the 21st century will require teachers to be knowledgeable about a technology influenced student body and how to create learning environments which integrate technology in the support and delivery of instruction. Teachers in the new millennium should view technology as a cognitive tool that has the potential of encouraging inquiry-based learning and reinforcing instructional concepts, Planning technology connected lessons will require teachers to think more creatively about how students learn and plan lessons which respond to the vast variety of learning needs.

Technology Supported Learning:
New Models for Creating Technology Literate Teachers

Dr. Barbara Holmes – Center for Excellence in Teaching and Learning

Introduction

New models of training teachers to use technology must recognize several very important concepts:

1. Training teachers to use technology should incorporate the principles of andragogy and adult learning.
2. Teachers must be helped to redefine their roles and shift from giver of all knowledge to facilitator of learning.
3. Teachers must become comfortable in relinquishing some of their authority in the classroom and become co-learners with the student.
4. Teachers must engage in continual learning and become active students of technology and its use as a cognitive tool.

Training Teacher Adults to Use Technology

Training teachers to use technology is an exciting and rewarding experience. Our training programs have recognized that Knowles (1970) assumptions about how adults learn are still valid:

1. Adults need to know why they are learning something and how it affects them directly.
2. Adults bring to the training session a repository of knowledge, life and work experiences.
3. Adults use a hands-on problem-solving approach to learning

In order for students to learn with technology, teachers must accept a new model of learning (Jonassen, 1999).. Technology enabled classrooms allow students to engage in inquiry-based learning with the teacher's role changing from direct instruction with intellectual authority. This new model of learning should be experienced by teachers in a technology training situation. In training over 400 public and private school teachers to use technology, we have discovered that when teachers become students themselves and confront the unknown technology frontier, they quickly experience anxiety and frustration and need immediate reassurance that learning will occur. In this training situation, teachers find that they are not all knowing and are dependent on the trainers and classmates to navigate successfully through the lessons. This experience helps teachers to understand how important it is to create appropriate conditions for technology learninghow vital it is to experience this learning in a non-threatening situation. Teachers discover that it is acceptable to "not know" and they do not have to fear the shift in their intellectual role. When teacher learning occurs in a collaborative setting, teachers become active co-dependents in the learning situation and recognize that the active, energized classroom is a natural fertile learning culture which facilitates rather than hinders student learning. Consequently, teachers begin to see and accept the notion that the "learning noise" generated by excited learning contributes to the overall success of the lesson.

Instructional events

In observing the learning of teachers participating in technology training, the paradigm of instructional events shifts from the Gagne model:

EVENTS OF INSTRUCTION NEEDED FOR TEACHING TEACHERS TECHNOLOGY

Gagne's Model	**Teacher Technology Training Model(TTTM)**
Gain attention	Review the teacher's motivation for the training
Inform learners of objectives	Connect training to teacher tasks
Stimulate recall of prior learning	Relate training to improved learner outcomes
Present the content	Initiate technology exploration
Elicit performance	Provide a technology lesson in a collaborative "learner centered" environment
Assess performance	Production: Have teachers produce a technology work product
Enhance retention	Evaluate and Assess the technology experience Apply technology learning to a teacher task/classroom application and assess effectiveness

As teachers explore technology and gain confidence in its use, the appreciation of technology as a cognitive tool increases. Having teachers explore the World Wide Web helps teachers to see the vast array of resources available to increase instructional effectiveness. As teachers become more experienced in searching the web and harvesting its resources, it becomes apparent that each teaching discipline can be enhanced by technology and can lead to student initiated research and inquiry. Teachers find that technology allows instruction and learning to be extended beyond the traditional classroom and their influence on students is extended as well.

Teacher technology learning is incremental. Teachers should not be overwhelmed with all that technology has to offer. Trainers should apportion training so that teachers gain fundamental mastery of specified skills before moving on to more complex technological applications. When teachers come out of exciting, energized technology training sessions, this new energy and insight can be readily applied to new ways of teaching and learning in teacher classrooms.

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FACULTY TRAINING AND UTILIZATION OF TECHNOLOGY IN PRESERVICE EDUCATION

Richard M. Johnson, Ph.D.*

Findings from an Office of Technology Assessment (OTA) Report, *Teachers and Technology: Making the Connection* (1995) listed several barriers that might be encountered in efforts to integrate technology at the higher education level. A key barrier sited was the minimal professional development opportunities that are often available for faculty in institutions trying to integrate technology. Faculty training needs range from basic operation and concepts to integration, i.e: lesson development, implementation and assessment strategies. Lack of time to redesign courses to integrate technology and persisting academic responsibilities such as research, service, and publication are also listed as significant barriers. Depending on how broad the definition of scholarly activity at a university, technology integration and associated training may or may not be included. A faculty member desiring promotion and tenure will understandably opt to spend time on activities that will fulfill promotion and tenure objectives.

In our program at Boise State University, we wanted faculty to feel their time was valued and at the same time meet national and state technology goals. In exchange for a faculty member's active participation in our project for one semester, we addressed each barrier cited by OTA (1995) for faculty members participating in the project. To address the lack of funds for equipment, a new computer was provided for each faculty member participating in the project. To address the lack of professional development opportunities, an intensive faculty training program was implemented involving in-and-out of the classroom technology integration support for participating faculty. To address the time barrier, each faculty member participating in the active semester of training received a payment equivalent to the payment made to faculty members assuming an overload in coursework.

It was felt that by making a concerted effort to pay the faculty for their time, they would see the time they invested on the project as time well spent. Upon request, we provide documentation of a faculty member's participation in the program for the promotion and tenure committee. In addition, we work directly with promotion and tenure committees to ensure that these committees have a complete understanding of our project, its initiatives, and its relevance to national and state standards.

The need for advanced faculty training in technology led project coordinators and staff in search of a curriculum on which to base the training. It was determined that the ISTE Foundational Standards for All Teachers (1999) would be used. The ISTE Standards were chosen for two reasons: 1) Practitioners in P-12 and higher education recognize these standards on an international level, and 2) NCATE collaborated with ISTE to determine the role of technology in teacher education when designing their Professional Standards document (2000).

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The ISTE standards are broken into six general categories summarized below:

- Technology operations and concepts
- Planning and designing learning environments and experiences
- Teaching, learning and the curriculum
- Assessment and evaluation
- Productivity and professional practice
- Social, ethical, legal, and human issues

Designed to meet these basic competencies and standards and to allow opportunity for individual exploration of areas of interest by faculty, the training was divided into two parts. First, all participating faculty completed a whole-group 36-hour session spanning two weeks at the beginning of the semester. In this session, trainers addressed ISTE standards and technology competencies, as well as integration of technology into teaching and learning.

The second training component, 14 hours total, was individualized for each faculty member, allowing them to focus on their own areas of interest. Faculty scheduled and completed the additional training throughout the remainder of the semester. These opportunities for training included: weekly workshops, one-on-one training, fieldtrips to K-12 technology-supported classrooms, and an opportunity to attend the National Consortium for Computing in Education (NCCE) conference. It was typical for faculty to exceed the 14 hours required for individualized instruction. At the end of the active semester of participation, faculty members were required to submit four technology-supported lesson plans, one of which had to be implemented during the same semester. Project staff also hosted a culmination meeting for faculty at which they shared their technology integration experiences of the semester and their plans for future integration.

Subsequent to completion of the training sequence, the 20 professors taking part in the program were asked to complete a survey which addressed their utilization of technology in their classrooms as well as their satisfaction with technology use. This survey reflects responses in the first course taught by these professors upon completion of the training sequence. Table 1 presents frequency of selection of computer uses. The respondents were asked to check all that applied to their course.

These data indicate that the most frequent usage of technology by these technology-trained professors involve general communication and visual displays. Most of them used presentation software (PowerPoint) in their classrooms. The least frequent uses involved more sophisticated uses of technology requiring higher levels of technology skills. It is be expected that these more advanced uses would increase as professors gain more experience and develop more advanced skills.

Table 1. Frequency of selection of technology uses.

Technology Use	Freq.	% of Total
to communicate information	17	10.0
to plan, draft, proofread, revise, and/or publish written text	16	9.4
to deliver instruction	15	8.8
to organize and store information	14	8.2
to create visual displays of data/information (graphs, charts, etc.)	13	7.6
to create graphics or visuals of non-data products (diagrams, pictures, figures)	13	7.6
to communicate with others	13	7.6
to facilitate understanding of a concept	13	7.6
to create visual presentations	12	7.1
to gather information from a variety of sources	12	7.1
to perform calculations	9	5.3
to manipulate/analyze/interpret data	8	4.7
to collect data and perform measurements	4	2.4
to support individualized learning	4	2.4
to create models or simulations	3	1.8
to compensate for a disability or limitation	3	1.8
to remediate for basic skills	1	0.6
Total	170	100

Participants also were asked to respond to eight questions concerning general satisfaction with use of technology in their classrooms. Overall, the respondents indicated they would like to increase the use of technology in their classes and would like to see more resources become available for their use.

In conclusion this technology training program has been successful. The graduates of the program are positive toward the use of technology in the classroom and provide good models for preservice teachers in our program.

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A COLLABORATIVE MODEL OF INTEGRATING TECHNOLOGY K – 16

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When we look at the integration of technology into instruction, we find many points of agreement. Equipment must be usable, up to date and available to teachers. We must help teachers find appropriate links to the established curriculum, so that technology becomes a transparent mode of delivering instruction. We must go beyond drill and practice to higher order level thinking skills. Training must be hands-on, preferably concurrent with use, and at the appropriate level for the teacher. Why is it then, in spite of so many best efforts, that we still fail to see technology used as often or as appropriately, as it could be used in many classrooms? One answer can be found in the way we prepare teachers in their pre-service and student teaching years in the uses of technology.

Trinity College has taken on that issue. Trinity College was founded in 1897 in order to provide higher education opportunities for women, at a time when many institutions of higher learning were closed to women. The Sisters of Notre Dame established a college whose mission was to educate women of all faiths in a setting located just a mile from our nation's capitol. Over the years, Trinity's mission has evolved. But the commitment to preparing young women, and the commitment in particular to the graduates of the Washington DC public schools and to the schools themselves, has grown. The undergraduate enrollment at Trinity College is still all women; the graduate classes and weekend college includes males and females. When all programs in our college of science and arts, school of education and school of professional studies are combined, Trinity College educates more than 5000 students every year. Our main focus continues to be on preparing teachers and providing in-service training to current teachers, as well as the opportunity for advanced degrees.

Trinity College has adopted a strategy that provides for a consistent, three-pronged approach to preparing teachers to use technology. Our faculty is being trained in the infusion of technology into their instruction, and the revision of course syllabi to reflect that change. Classroom teachers who serve as cooperating teachers are being trained and provided with equipment, to plan and implement lessons that reflect current best practices in using technology in instruction. And, finally, student teachers are receiving instruction in skill level use of work processing, spreadsheet, database, email and Internet as well as pedagogical approaches to using these skills to provide technology-infused instruction.

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The first group of student teachers was trained this semester in skills related to MS Word, Excel spreadsheets, and PowerPoint. Each student completed a self-assessment of computer skills, and they were assigned to attend a workshop based on the assessment. Each workshop included not only skill level training but also applications to the classroom. For example, in the MS Word class the students learned mail merge and how to use this in writing a letter home to parents. In the Excel workshop they learned how to set up a grade book using the spreadsheet and formulas. PowerPoint assisted with their classroom presentation skills. Our training of pre-service teaches will be formalized starting in the Fall 2001 with the receipt of the Intel Teach to the Future Grant. The training that Trinity faculty will receive as a result of this grant will lead to the establishment of a required three credit hour course in technology skills and implementation, following the model of the Intel training.

The intensive workshops for classroom teachers and college faculty will be held this summer. The 'Preparing Tomorrow's Teachers to Use Technology' Grant (PT3) will include a 3 week, 45 hour session with classroom teachers and college faculty working side by side to learn, plan, and implement technology in instruction. The AOL Time Warner Foundation grant allows for training of 60 classroom teachers and administrators from Washington DC Public Schools in three two-week sessions. These programs will be discussed now in greater detail.

The AOL Time Warner Foundation Grant allows us to establish the Educational Leadership Technology Institute (ETLI) this summer. We will train 60 teachers and administrators from 12 schools in DC Public School system – 4 high schools, 3 middle schools, and 5 elementary schools. The schools were chosen in consultation with DC Public School and represent a range of location and enrollment. The participants will attend a two weeks session by grade level. During this time they will receive hands-on training in the ETLI classroom on our campus related to the integration of technology into their instruction. Topics include Introduction to Microcomputer Applications for Teachers; The Internet and Instructional Strategies; Educational technology Projects for Teachers; Enhancing Curriculum Instruction with Technology; and One Computer, Two Computers, Three Computers, Four…" Guest speakers will be current practitioners including Dr Acosta-Sing, principal of the Mott Hall School in the Bronx, NY who implemented the Microsoft Anywhere, Anytime Learning. Representatives from Boxer Learning, Riverdeep software and Classroom Connect will give short presentations. Classroom teachers from DC Pubic Schools who are currently using technology in instruction will be included as presenters, to give teachers quality time to interact with their peers, ask questions, and develop lessons.

Each participant will receive a laptop and a two-year account to AOL. In addition, every week the participants will spend one day at AOL Headquarters in Dulles, Virginia. They will be matched to AOL employees who will serve as partners or mentors to the teachers and their schools throughout the coming school year.

Many of these teachers will serve as cooperating classroom teachers to our student teachers in the years to come. Therefore, Trinity College benefits greatly from their expertise, as will the children they teach.

The Preparing Tomorrow's Teachers to Use Technology grant (PT3), received from the Department of Education, includes a three-pronged plan to prepare future teachers – train them, train the cooperating teachers, and train the college faculty. . Each of the 2 elementary schools received a 10-computer station lab with smartboard and projector. Trinity College received a 15-computer station lab with smart board. The third participating school, Northwestern HS, is filled with technology and we used that site for our meetings.

The first group of 15 teachers and 12 faculty members will be trained this summer. They will be grouped into K-16 teams with a unique focus for each: elementary education, secondary education, and special education. Time for each session will be divided into presentation, hands-on, and teamwork. The final product expected from each faculty member is a revised syllabus for at least one course that will be taught in the fall, with technology infused into the curriculum. The teachers are expected to develop several lesson plans or a unit plan that includes the use of technology. Of course, the added benefit is the interaction K – 16 on subject matter issues, pedagogy, and methods in addition to the discussion on technology. It promises to be a rich experience for everyone.

Initial response from all participants has been overwhelmingly positive. We will engage in specific assessment of each program to determine results as well as recommendations for future efforts. The PT3 grant is a 3-year grant that will repeat the summer training next summer. Sessions will also be held on campus for college faculty who were unable to attend. The AOL Time Warner Foundation grant calls for the development of ongoing professional development courses through the Office of Professional Development at Trinity College to address the needs and interests of participating schools.

Every step has been exciting – from the transformation of a 100 year old building into technology-rich classrooms, to the enthusiasm and interest of faculty, teachers, and students. This is just the beginning of our efforts to send our beginning teachers into the classroom with the skills and knowledge they need to become successful teachers in the 21st century.

MICROSOFT TEACHER TRANING GRANT SUPPORT: HISTORY OF A LONG TERM COMMITMENT TO A STATE UNIVERSITY TEACHER TRAINING PROGRAM

Dr. M. C. Ware

INTRODUCTION

In the mid 1980's SUNY Cortland was a member of a consortium of NYS colleges receiving grant support in the form of hardware and software from IBM corporation. At the end of that funding support, consortium members were encouraged to apply for a new source of funding (Microsoft software support).

This paper will describe the Microsoft grant partnership program for higher education.. The paper will also outline types of progress made at SUNY Cortland which could not have been made without such support; describe some of the difficulties of a software grant (as opposed to grants which supply funds for hardware, personnel, etc.) Finally, the paper will make some points about corporate grants as "philanthropy or marketing," which are two possible ways to look at such sources of support.

HISTORY

Microsoft Corporation initiated software grants which coincided with the marketing of Windows software. The proposals requested information concerning the institutions requesting the software, proposed uses in teacher education, platforms, and proposed curricular innovations. Over the years both the proposal and evaluation processes have been streamlined. Software grants take the form of site licenses for (usually) the total number of computers which might be located in a computer teaching lab and are usually worth approximately $35,000 a year.

ISSUES

In the early years of the grant process, several problems emerged which are worthy of note: First, in terms of "who's in charge", it was difficult to determine the person/persons who should be signing the software license agreements, due to the many conditions imposed on the college by the agreements.. In more recent years, the college has hired an Associate VP for Information Technology which has centralized computer services and

State Univ. of New York - Cortland

signing such agreements on behalf of the college is no longer so difficult. Another problem which has impacted our campus is the sheer volume of shipments, and what to do with "older" software which, due to the license, really is not ours to dispose of. In SUNY Cortland's case, we have a room full of boxes of software (note: software packaging has never been noted for space conservation). Some items are out of date (earlier versions of Encarta, for example) but none has ever been destroyed. It is not ours to donate, and so it takes up valuable space. Other issues which have plagued us include: rapid turnover of contact people at Microsoft who deal with these grants. Another difficulty in the early years of the grant was hardware. Since this was clearly a software grant, it did not provide funds for either hardware or staffing…and often a gift of software had hardware implications. In the early 90's many of the lab computers did not have facility for sound – neither speakers or headphones. Much Microsoft software of the instructional kind did need sound capabilities. It was difficult to convince the "powers that be" that a grant could be COSTING them money, as they needed to purchase hardware to show off the software's capabilities. These problems have decreased over the years, but were monumental at first..

PROGRESS ATTRIBUTABLE TO THE GRANT

SUNY Cortland did a number of things using grant software which we would probably not have done (or not have done as soon) due to the Microsoft grant. Among them was the effort to teach an integrated package on **both** IBM and Mac platforms to teacher education students. A course, EDU 314, was developed which emphasized use of word processing, graphics, spreadsheets in educational applications. Microsoft Works was used and taught on both platforms so teachers would be ready for whatever school configuration in which they found themselves. Also a course for school administrators was developed using Word, Excell and Access – that course would probably not have been developed or taught without the Microsoft support.

PHILANTHROPY OR MARKETING?

Eight years ago, the author of this paper and a colleague (Stuck and Ware, 1993) did an analysis of some corporate technology grants (specifically IBM Program for Teacher Preparation and Advancement and Apple's Classroom of Tomorrow program). Some of the findings of this analysis seem relevant to the Microsoft grant program also, and will be mentioned here and discussed in more detail in the presentation.

This analysis was prompted by concerns stated by Apple (1988) and others which relate to the philosophical issue of whether (or how much) industry/business should be involved in (and dictate the goals of) education.

An underlying theme in the previous paper and in this one is that such corporate grant programs may not be as philanthropic (nor research oriented) as they seem. When analyzed carefully for the hidden curriculum to which they contribute, some interesting ideas emerge: One sees a curriculum in which one type of computer or computer configuration or software is considered "best"; a curriculum which seeks research data to support its own claims; and a curriculum which seeks to replicate itself, thus providing a large installed base of a certain type of computer (or specific software) in the schools -- and thereby influencing purchase in the homes and future business sites of the students affected.

CONCLUSION

An earlier paper analyzed documents from the ACOT project supported by Apple Computer and IBM/NYS's partnership with public schools and schools of Education. This paper extends that "look" to the Microsoft Higher Education partnership grants.

This paper's message is simple: grant proposals are not always what they seem. Computer corporations' gifts may make it possible to accomplish things otherwise impossible, given teacher education program budgets. However, a seemingly benign document may also be a front for getting industry's foot in the door. Software grants may cost money, while appearing to "save money" Institutions must look carefully at industry education cooperation, so that the goals/aims of both may be served.

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Large-scale Education Reform:
Role of Change Partners, Specifically Sponsors and Advocates

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INTRODUCTION

"Start with the children . . . they are the present and future and serve as our guiding star for society's purpose, value, and quality of life."
Start With the Children (2000)

Throughout the ages, men and women have struggled with educating their young in the most effective and efficient ways possible. They have learned the value of education is not a unique interest of a family, community, state, or nation. Education is now embraced by a global society and serves as the equalizer for the betterment of all.

To meet this responsibility, it becomes society's challenge and opportunity to identify, design and develop interventions that provide quality education. Therefore in the realm of this proposition, the goal of this paper is to focus on large-scale initiatives designed to address the following three questions: 1) How does society deliver a quality education to all? 2) How are infrastructures, the organizational system and subsystems, significant to a successful change initiative? 3) How do individual roles and responsibilities within the infrastructure affect the outcomes?

ROLES OF SPONSORS AND ADVOCATES

For the sake of this paper, definitions of sponsors (initiating and sustaining) and advocates are based on the work of change management/leadership expert Daryl Conner and findings he presented in *Managing at the Speed of Change (1992)* and *Leading at the Edge of Chaos (1998).*

A sponsor is defined as an individual or group who has the authority to legitimize and power to enforce the intervention (e.g., the Florida State Legislature). Sponsorship takes far more than ideas and rhetoric; it requires the ability and willingness to apply the meaningful rewards and pressure that produce desired results. Major change will not occur unless appropriate sponsors demonstrate sufficient commitment. There are two kinds of sponsors, initial and sustaining. An initial sponsor is defined as an individual or group who has the power to break from the status quo and sanction a significant change. An initial sponsor is usually higher in the hierarchy than those who must perform the duties of sustaining sponsors (Conner, 1992).

A sustaining sponsor is defined as one who supports and follows through with the sponsor commitment and allocation of resources for his/her arena of influence. A sustaining sponsor has enough proximity to local targets, those individuals or groups who must actually change, to maintain focus and motivation on the change goals (e.g., Florida State Department of Education or Florida School Year 2000 (SY2000) operational test site school superintendents). Sustaining sponsors minimize logistic, economic, or political gaps that exist between layers of the organization (education system) and produce the appropriate structure of rewards and punishments that promote achievement (Conner, 1992).

An advocate is defined as an individual or group who wants to achieve a change but lacks the power to sanction it. However, advocates are influential and valued for the advice and recommendations given to the sponsor and others (e.g., SY2000 Public School Council or Policy Advisory Council). Successful advocates spend time with sponsors engaged in problem solving and persuasion/communication) and pain management (e.g., dealing with resistance, barriers, and constraints). They help the sponsor realize the importance of the desired change (Conner, 1992).

To understand the role and influence of sponsors and advocates, the following assumption must be carefully thought through: There is a tendency for those involved or affected in a change initiative to overestimate the short-term effects of change and underestimate the long-term effects. The short-term effects are the results of incremental inputs and processes. Change transforms into long-term effects when people are results-driven and have been given purpose and value as to why the change is required. Initial and sustained sponsorship are key to making this type of transformation/change possible (Conner, 1992; Reigeluth & Garfinkle, 1994).

Many reform interventions have been short-lived due to such things as: the lack of clear purpose or value; organizational alignment of inputs/resources (e.g., internal and external); processes (e.g., strategies and methods); and outputs (e.g., measurable results) and fully committed and sustained sponsorship (Branson, 1998; Kaufman, Herman, & Watters, 1996; Conner, 1992, 1998). This type of change process critically depends on successful planning, implementation, and evaluation and research-based by applying the information and experience of the following data sources: General systems theory, Diffusion of innovation theory, Instructional systems design principles and concepts, Change management/creation principles, and Education reform initiatives/interventions.

Based on his "upper-limit hypothesis" (Branson, 1987, 1998), an example of a large-scale intervention was the Florida SY2000 Initiative, a noble attempt to change how education was being delivered and applied in the state of Florida. Implementing SY2000 was a major change that required knowledge, skills, and resources required for moving from where the state of education was to where it should be. It was a major transition and transformation for people and processes. The greatest challenge was to sustain the change for the long journey, making a difference in the lives of tomorrow's child. Leading change and diffusion of innovation experts highlight the critical roles of leadership and sponsorship for the successful implementation and maintenance of major change or reform efforts (Conner, 1992, 1998; Ely, 1990; Rogers, 1995; and Waterman, 1990). It is for this reason that sponsors and advocates are selected as the individuals by which this author placed her focus.

WHAT DRIVES EDUCATION REFORM EFFORTS?

"In times of change, the learner will inherit the earth while the learned are beautifully equipped for a world that no longer exists."
Eric Hoffer

The following scenarios illustrate a rationale for having effective schools that focus on the value that learners add to themselves, their families, their communities and society as a whole. Based on outcomes of these scenarios, the forces behind these change efforts become clearer.

Imagine a doctor entering the operating room and not being familiar with the patient's history, current condition, or required treatment; or a gourmet chef preparing a banquet without having the ingredients to create his world-renowned entree. Imagine an auto mechanic who doesn't have the proper tools to get a vehicle to meet safety standards; or the baseball player without the skill set to be on the team and perform as a contributing member.

As an analogy, now conceive such individuals as products of our education system. An education system that starts long before and long after any formal training, a learning system that is life-long and prepares its members to be self-sufficient, self-reliant contributing citizens of a democratic society. According to Kaufman, Herman, & Watters (1996) these scenarios are headed for dismal outcomes because someone didn't 1) identify the desired learning outcomes, 2) determine what methods and strategies are required to reach accomplishment, or 3) set the criteria to measure whether desired outcomes were achieved as the end result.

These scenarios illustrate a call to educators to not only address knowledge and skill attainment, but to include the skills required for life-long learning. As educators, we have a responsibility to apply the processes (e.g., plan, analysis, design, development, delivery, and evaluation) required for the diffusion of education. Successful outcomes of such diffusion increase the probability of learners becoming self-reliant, self-sufficient contributing citizens.

How then are infrastructures, the organizational system and subsystems, significant to a successful change initiative, diffusion of education? The infrastructure of SY2000 was *The Florida Learning Support Systems (SY2000 Model)*. The model was envisioned as a way to enable all Florida students, even the disadvantaged, to excel in school. Its goal was to support high student scholastic performance, contribute to Florida's communities, and better prepare graduates for complex jobs in workplaces that are increasingly demanding, technologically sophisticated, and global. The model was designed to meet the needs of its stakeholders: student, family, community, business and industry, and state and local agencies.

The SY2000 mission was to create a technology-supported education system for increasing the quality and productivity of public school students in Florida. The system included electronic networks, tools, and processes that would enable Florida schools to achieve the Blueprint 2000 goals and district goals in School Improvement Plans. Blueprint 2000 articulated the goals and standards of Florida's School Improvement and Accountability legislation.

The vision was for each student to acquire the foundational skills and competencies needed to succeed in adult life in an Information Age. SY2000 design principles were derived from research in a variety of fields such as teaching, learning, motivation, psychology, instructional design, engineering, business, management, financial management, communications, and electronics. The total schooling process was guided by a quality system linked to international quality standards.

Accomplishment of 21st century educational reform embedded in constant change in technology advances, information explosion, and rapid knowledge acquisition demanding a learner-centered environment may very well depend on the words spoken by futurist Alvin Toffler, (Retrieved February 8, 2001 on the World Wide Web: http://www.gunnar.cc/quotes/text.html). "The illiterate of the 21st century will not be those who cannot read and write, but those who cannot learn, unlearn, and relearn."

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University Cooperation with Neighborhood Organizations: Project Management Education in Urban Neighborhood Redevelopment

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ABSTRACT

This paper discusses one aspect of a series of cooperative projects between university researchers, teams of university students, neighborhood associations, and government organizations to assist residents of diverse population (often low income) neighborhoods to develop reliable methods for identifying specific neighborhood problems, and to use those methods to mobilize appropriate governmental and private-sector agencies to assist in remediation. The focus of the paper is on the use of project management technology by graduate students to develop project management plans and processes for various aspects of the neighborhood redevelopment program. The goals of this cooperative educational effort are examined, and the benefits to the community and the students are noted.

INTRODUCTION

There has been considerable recent research related to ways to increase citizen/neighborhood participation in community development efforts, and to encourage community sustainable development (see, for example, Ault, Riley & Gleason, 2001, 2000; Botes & van Rensburg, 2000; Morrissey, 2000; Aigner, Flora, Tirmizi & Wilcox, 1999; Hiebert & Swan, 1999; Higgins, 1999; Kamara & Kargbo, 1999; Khan, 1999; Savaya, Moreno, Lipschitz & Arset, 1999) . This article reports results of student involvement in research conducted with a variety of diverse-population neighborhoods in Omaha, Nebraska. The research was conducted as part of an on-going series of projects in which a variety of technologies (including geographic information systems, project management, decision technologies and Internet technologies) are being used to facilitate community planning and neighborhood redevelopment. The projects evolved from multidisciplinary environmental-justice research conducted in cooperation with a number of organizations and neighborhood associations. The projects focus on assisting residents of diverse-population neighborhoods to develop reliable methods for identifying neighborhood problems, and to mobilize appropriate governmental and private-sector agencies to assist in remediation.

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Students in several courses have been involved in technical experience related to this project, including undergraduate students in courses on environmental risk (Environmental Science department) and research methods and statistics (Sociology department) in the Creighton College of Arts and Sciences, and graduate students in project management and decision technologies courses (Information Systems & Technology department) in the Creighton College of Business Administration. The focus of this paper is on the use of project management technology by graduate students to develop project management plans and processes for various aspects of the neighborhood redevelopment program. The materials provide a step-by-step process that neighborhoods can use to successfully work with governmental agencies to identify and achieve neighborhood redevelopment goals. The goals of this cooperative educational effort are examined, and the benefits to the community and the students are noted. Due to space constraints that limit discussion, the goals and benefits are simply listed herein.

GOALS

Research and Community-Service-Related Goals

Goal 1. Categorize the entire range of activities related to a neighborhood redevelopment project (NRP).

Goal 2. Group the NRP activities into appropriate subprojects.

Goal 3. Develop project plans for each of the subprojects.

Goal 4. Develop a project plan for the overall project that incorporates and integrates all of the subprojects.

Goal 5. Operationalize the project plans for the overall project and each of the subprojects.

Goal 5.1 Develop project and subproject organizational structures.

Goal 5.2 Develop project and subproject work breakdown structures.

Goal 5.3 Develop project and subproject schedules.

Teaching-Related Goals

Goal 6. Use the activities described in Goals 1-5 to provide students enrolled in the project management course with hands-on project management experience related to the type of socially responsible activities which are an important aspect of the Creighton educational experience.

Goal 7. Use the activities described in Goals 1-5 and feedback from activities described in Goal 6 to develop classroom case materials for use in future offerings of the project management course.

BENEFITS

The project management material provides a step-by-step process that neighborhoods can use to successfully work with governmental agencies to identify and achieve neighborhood redevelopment goals.

Creighton University's interest in involvement in socially responsible activities within the Omaha community will be actualized via the activities in this project.

The activities provide a means to involve students in meaningful research efforts.

The activities provide students with hands-on project management experience.

The project management efforts provide students the opportunity to be involved in socially-responsible course activities.

The activities provide students with case-based course materials.

REFERENCES

Due to space constraints, reference material has been omitted. However, the information is available from the first author.

EMPIRE STATE PARTNERSHIP PROJECT: AN ARTS CONNECTION WITH A FOCUS ON IMPROVING LEARNING VIA TECHNOLOGY

Walter S. Polka, Ed.D.[°]
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The Lewiston-Porter Central School District in Youngstown, New York, and the Castellani Art Museum of Niagara University have collaborated since 1997 to strengthen the role of the arts in the current standards reform movement via an Empire State Partnership (ESP) Program. This program is an interagency collaboration between the New York State Council on the Arts and the New York State Department of Education (SED). It is designed to identify, develop, and support best practices in educational and cultural collaborations that focus on achieving the New York State Learning Standards.

The Lewiston-Porter and Castellani Art Museum ESP team has consistently encouraged secondary school students involved in the various curriculum activities of the partnership to use their experiences to actively construct understandings that make sense to them and to apply their expanded understandings to authentic situations (Olsen, et al, 2000). This constructivist approach to contemporary secondary education (Eggen and Kauchak, 1997) and contemporary museum education (Hein, 1999), has been facilitated and enhanced because of the use of technology.

The utilization of technology in the program has reflected a philosophy of collaboration and curriculum infusion whereby the cultural partner responds to needs expressed by the school, rather than applying technology as another curricular layer. This model has proven successful in other contemporary educational settings (Moffitt, 2000). The integration of new technology through this ESP program has been a natural – and necessary – outcome. Technology has been instrumental in deepening the impact of the project in the high school curriculum and facilitating the further development and sustainability of specific ESP activities. Furthermore, technology has facilitated the integration of necessary services into the curriculum, such as graphic design and videography. These technology-oriented services, once relegated to "outside" professional contacts, became "in-house" student activities because of the needs identified by the ESP team.

Consistent with the characteristics of effective twenty-first century schools and school systems (AASA, 1999), there are three major roles that technology has played in shaping and sustaining this partnership:

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A. Technology has promoted authentic learning experiences for students that address learning standards in high school English, art and social studies.
B. Technology has provided students with experience in using professional tools.
C. Technology has facilitated both internal and external communications.

The following examples illustrate technology's impact on the curriculum:

1. English and art students participating in the ***Writing on the Wall*** project and exhibition have used MS Word to create interpretive wall texts and artists' statements for display at the Museum. The curatorial experience afforded by ***Writing on the Wall*** demands specific and precise use of the software for all students. They must create and submit MS Word files, email attachments, and Mac disks for their wall texts and artists' statements using a Museum-prescribed format for font, font size and page layout. This specific utilization of MS Word not only gives students authentic experience with using the application, but also ensures a uniform appearance of their work for the final exhibition held at the Museum. Through this process, the students learn that attention to detail is crucial to the success of a Museum exhibition, and is facilitated through the use of technology.
2. Art students in graphic design classes have used Adobe InDesign to create posters, flyers and other projects to publicize the many activities of the ESP Project. A need to publicize ESP activities to the community created authentic learning opportunities for students to use technology. Moreover, the use of InDesign introduced a professional graphic design tool to the art curriculum, giving the students exposure to the industry standard in their medium. The application of this software has expanded teaching capabilities, broadened and diversified the media offered by the art department, and given students a head start on proficiency with software they might well use in college and in future careers.
3. Documentation of our ESP activities necessitates photography and videography to capture the activities of visiting artists and live theatrical presentations. Videography, in particular, was introduced to the art curriculum to meet this need. Students and teachers evolved from using traditional analog video to the use of digital video and non-linear video editing, using digital video cameras, a Macintosh G4, Adobe Premiere, After Effects, and GoLive. As with the adoption of InDesign, the implementation of these videography tools created authentic learning opportunities through practical applications of technology and introduced another suite of professional tools to the art curriculum. From its roots in occasional, informal analog viedography, the student videography for ESP actually developed into a full course in videography in the art department – permanently embedding the use of this cutting-edge technology into the curriculum. Furthermore, the inception of this class has continued the diversification of media offered through the art department, bringing many "non-traditional" art students into the program.
4. Applications of technology have facilitated communication, administration and documentation within the partnership. The use of email (Outlook Express) has facilitated consistent and convenient contact and transfer of files

between the cultural and educational partners. MS Word, Quark and PowerPoint have been indispensable for the museum's curator of education to produce promotional materials, reports and presentations for ESP activities. Technology has also been instrumental to the public relations, dissemination and advocacy efforts beyond the Partnership. For example, PowerPoint and Kai's Powershow have been used to present the Partnership's work to parents, School Board members, and other ESP partnerships and Arts-in-Education programs throughout New York State. These multimedia presentations on specific ESP projects will be added to the ESP information which will soon be available (June 2001) through the Castellani Art Museum website at http://www.niagara.edu/cam.

The Empire State Partnership Project between Lewiston-Porter Central School District and the Castellani Art Museum of Niagara University has successfully developed an arts connection, with a focus on improving learning via technology. The improvement in student achievement on the New York State Standards as a result of this project has been well documented (Olsen, et al., 2000). The Project has effectively coordinated methods, practices and lessons with the Standards, as advocated in contemporary literature and research (Schmoker & Marzano, 1999), and infused technology in the most appropriate fashion to free the power of students' minds (Healy, 1999). The quintessential American educational philosopher, John Dewey, would be very pleased with this partnership because it has enabled each participating student to fulfill his or her learning goals by effectively using the science, art and industry of the contemporary world (Dewey, 1902).

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International Conference on Technology and Education

ICTE Tallahassee 2001

Organizing Committee

A Conference is defined by the people who plan and organize it. ICTE Conferences would not be possible without extensive support and participation from the host institution and from numerous key individuals from participating educational institutions, local civic groups, and numerous public and private organizations.

For the Tallahassee 2001 ICTE Conference, a number of key individuals and organizations have made major commitments to defining and organizing a first class event for this 19th annual ICTE Conference; these individuals have spent many long hours in planning *ICTE Tallahassee 2001*.

The Board of Directors of ICTE, the ICTE Executive Committee, and the ICTE Planning and Advisory Board extend our sincere appreciation and thanks to the following individuals and organizations, comprising the *ICTE Tallahassee 2001 Organizing Committee*, for their outstanding efforts and dedication to making *ICTE Tallahassee 2001* a success. The Conference would not have been possible otherwise.

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Learning Systems Institute, Florida State University

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Ms. Johnnie Slaton
Florida Department of Education

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International Conference on Technology and Education

Keynotes and Plenary Sessions

A number of notable speakers for keynote and plenary sessions are being arranged for *ICTE Tallahassee 2001*. As these are confirmed, and as details are received from each speaker, they will be listed in this section.

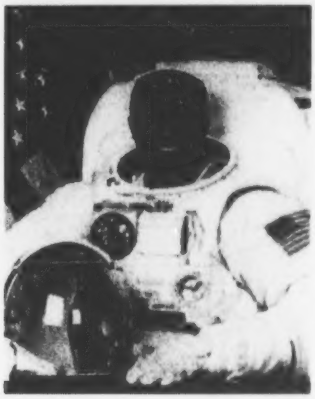
Plenary Session **Digital Nations: Promoting Human and Community Development using Information and Communication Technology**

Eleonora Badilla
Digital Nations at M.I.T. Media Lab

What does it mean for a nation to be a Digital Nation? Simply providing access to technology is not enough. It means that the people of the nation are able to use new technologies creatively: to express themselves, to create new products, to start new businesses, to strengthen their communities, to learn new ideas. The MIT Media Lab, through this new consortium, aims to empower people in all walks of life to invent new opportunities for themselves and their societies. It focuses especially on populations with the greatest needs -- children and seniors, under-served communities and developing nations. It explores how new technologies can help address the major social challenges of our times: education, health, sustainable development.

Keynote Session Educational Technology: My View in Time and Space

Captain Winston E. Scott, Vice President for Student Affairs
Florida State University



Captain Winston E. Scott is Vice President for Student Affairs at Florida State University.

Captain Scott was recently appointed to the Spaceport Florida Authority Board of Advisors, and also to the Air and Space Engineering Board, National Academy of Science. His numerous honors include the NASA Space Flight Medal (2); the Defense Superior Service Medal; the Defense Meritorious Service Medal; and the Defense National Defense Service Medal (2).

Captain Scott served as a Captain and Naval Aviator, United States Navy, from 1972 - 1999.

From 1992 to 1998, Captain Scott was a NASA Astronaut. His NASA service includes the following:

> Mission specialist on STS-72 in 1996 and STS-87 in 1997; has logged a total of 24 days, 14 hours and 34 minutes in space including three spacewalks totaling 19 hours and 26 minutes.
>
> STS-72 Endeavour (January 11-20, 1996) a nine-day flight during which the crew retrieved the Space Flyer Unit satellite (launched from Japan 10 months earlier); deployed and retrieved the OAST-Flyer satellite and conducted two spacewalks to demonstrate and evaluate techniques to be used in the assembly of the International Space Station; the mission was accomplished in 142 orbits of the Earth, traveling 3.7 million miles logging a total of 214 hours and 41 seconds in space including a first EVA of six hours and 53 minutes.
>
> STS-87 (November 19-December 5, 1997) the fourth U.S. Microgravity Payload flight, focused on experiments designed to study how the weightless environment of space effects various physical processes and on observations of the Sun's outer atmospheric layers; performed two spacewalks—the first, a seven hour and 53 minute EVA featured the manual capture of a Spartan satellite in addition to testing EVA tools and procedures for future space station assembly tests; the second spacewalk lasted five hours and also featured space station assembly tests; mission was accomplished in 252 Earth orbits, traveling 6.5 million miles in 376 hours and 34 minutes.

More on Captain Scott...

Plenary Session Becoming a Leader of Learning

Larry Wilson
Larry Wilson & Associates, Inc.

Organizations, like individuals, have very little control over the discontinuous changes that are occurring. What they do have control over is how to best respond to them to create competitive immunity and customer loyalty. The best organizational response is to create a culture that not only embraces change, but "kisses it on the lips". That's differentiation. So is transforming a fear based control and command culture into a trust based developmental culture that best prepares all associated to thrive in the future.

As a leader of leaders, Larry Wilson will tell you about the **10 C's of a "Play to Win"** culture that is the foundation to achieving the above results. For the past fifteen years, Larry has helped hundreds of leadership teams from major corporations around the world "create the organization, that if it existed, would put theirs out of business." Larry is not a speaker, he is an event ... and one you'll long remember. Bring your spouse, bring your open mind, and leave your ego at the door. Buckle up and get ready for a journey into the future.

His last book, *Play to Win! Choosing Growth Over Fear in Work and Life*, was selected Best Business Book for 1998 by *ForeWord* magazine as well as won the prestigious Benjamin Franklin Award for Best Business Book for 1998.

In addition to his speaking activity, Larry spends high-impact time with senior leadership teams helping them reinvent themselves and their organizations. American Express, General Motors, Du Pont, Citibank, Kraft, Ernst & Young, and British Airways are just a few of the corporations that have sent teams of senior executives to participate with Larry and his staff.

Larry has been recognized with a number of awards including Speakers Hall of Fame, Senior Fellow and Alumni of the Year at University of Minnesota and Ambassador of Free Enterprise by International Sales & Marketing Executives.

> About Larry Wilson
> *Larry Wilson is the founder of Wilson Learning Corporation and Pecos River Learning Centers. He has co-authored four best-selling books:* The One-Minute Sales Person; Changing the Game: The New Way to Sell; Stop Selling, Start Partnering. *His last book,* Play to Win! Choosing Growth Over Fear in Work and Life, *was selected Best Business Book for 1998 by ForeWord magazine*

Plenary Session Mission Possible: Design and Delivery of Effective Online Curriculum

Donna Weisman
The Florida Online High School

Your mission, should you accept it, is to glean clues from Cyber-teachers about effective online course design and delivery models from the Florida High School.

Online education is no longer a prediction for the future. FOHS Instructors and Course Designers have accepted the mission to provide relevant, rigorous, and real-life education to cyber-students. Join these brave agents as they reveal clues gathered by the development team at FHS, making this Mission Possible. Agents will unfold the inner-workings of an FHS Course. The action will take us through chilling and thrilling web-based assignments and activities. Participants can capture the methods and features used in designing online courses by keeping their ears to the ground. Informants on this mission of design include the infamous Gagne, the well-known Bloom, and the unforgettable Keller.

As all agents know, using communication devices of all types is important for keeping the undercover cyber-students engaged on their mission at every turn. Snoop into the secret files to see just how much communication is happening in the field.

This mission is not only for agents in online schools, but also applies to traditional field agents who will garner methods to create a classroom based web-lesson or unit.

Participants will find that online learning is truly a Mission Possible: this message will NOT self destruct in thirty seconds!

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ICTE Tallahassee 2001

Preliminary Program Schedule

Wednesday, May 2, 2001 -- Saturday, May 5, 2001

The following is the preliminary Program Schedule for *ICTE Tallahassee 2001*. Although preliminary, minimal changes are anticipated. Some Lecture Theatre assignments may change in the final program.

Persons presenting at *ICTE Tallahassee 2001* are asked to check the title and spelling for their paper, presenters, and institution, and to advise ICTE of any corrections that should be made. ICTE can be reached by e-mail at icte@icte.org

(Note that the *A* and *B* designations under the *Seq* heading indicate the sequence of papers in a particular lecture theatre during a one hour time slot. No *A* or *B* in the *Seq* column indicates a one hour presentation.)

Day	Time	Room	Seq	Paper Title	Presenter(s) / Details	Session Type	Institution	Paper ID
Wed	1:00 PM	Oglesby Student Union		Registration and Check-in	Oglesby Student Union	Registration		
Wed	3:00 PM	Oglesby Student Union		School Visits	Depart from Oglesby Student Union	School Visits		
Wed	6:00 PM	Union Courtyard		Welcome Reception	Union Courtyard Oglesby Student Union	Reception		
Thur	8:00 AM	Oglesby Student Union		Registration and Check-in	Oglesby Student Union	Registration		
Thur	8:30 AM	Oglesby Ballroom		Opening Plenary Session -- Welcome	Welcome	Opening		

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					Owen Gaede, Co-Chair Alberto Canas, Co-Chair David Walker, Co-Chair Video Welcome -- The Honorable Jeb Bush, Governor, State of Florida President D'Alemberte, Florida State University Tallahassee Mayor ProTem Steve Miesburg			
Thur	8:30 AM			Conference Keynote	Keynote Address: Captain Winston Scott	Keynote Address		
Thur	10:00 AM	Crossroads Cafe		Coffee Break		Coffee Break		
Thur	10:30 AM	Lecture Theatre 1		Blackboard and WebCT: A Side by Side Comparison	John S Sfondilias; Eastern Illinois University; USA	Paper	Eastern Illinois University	111
Thur	10:30 AM	Lecture Theatre 2	A	How to Increase Attention Using a Computer Assisted Teaching Procedure	J. I. Navarro; University of Cadiz -- Spain	Paper	University of Cadiz -- Spain	144
Thur	10:30 AM	Lecture Theatre 2	B	Effective Strategies for Evaluating Software	Kimberly Hardy, Susan Henderson; Florida Community College Distance Learning Consortium; USA	Paper	Florida Community College Distance Learning Consortium	225
Thur	10:30 AM	Lecture Theatre 3	A	Maximizing Administrative and Academic Technology Synergy	Shahron Williams van Rooij; DataTel; USA	Paper	DataTel	101
Thur	10:30 AM	Lecture Theatre 3	B	Multimedia Learning: A New Paradigm in Education	Mai Neo, Ken Neo; Multimedia University; Malaysia	Paper	Multimedia University	103
Thur	10:30 AM	Lecture Theatre 4	A	Learning Without Teaching: Use of ICT-based Models in Teacher Training	Svein Ove Lysne, Jostein Tvedte; Stord / Haugesund College; Norway	Paper	Stord / Haugesund College	134
Thur	10:30 AM	Lecture Theatre 5	A	Tailor Made for Education	Bob Strunz, University of Limerick; Ireland; Murray MacCallum, Napier	Paper	University of Limerick; Napier University	114

					University, Scotland			
Thur	10:30 AM	Lecture Theatre 5	B	Addressing the Competing Values in Technology Planning and Implementation	David Anderson; Eastern Michigan University; USA	Paper	Eastern Michigan University	155
Thur	10:30 AM	Lecture Theatre 6	A	Webmasters Training: Virtual Teams to Maximize Collaborative Efforts Between Counties and the State DOE via Cyberspace	Valerie Bryan; Florida Atlantic University; USA	Paper	Florida Atlantic University	161
Thur	10:30 AM	Lecture Theatre 6	B	Promoting mLearning by the UniWap Project within Higher Education	Heikki Kynaslahti, University of Helsinki, Finland; James P Sampson; Florida State University, USA	Paper	University of Helsinki; Florida State University	261
Thur	10:30 AM	Lecture Theatre 7	A	Conflict Management Among Adult Learners in the Computer-mediated Environment	Shahron Williams van Rooij; DataTel; USA	Paper	DataTel	102
Thur	10:30 AM	Lecture Theatre 7	B	Letting Go of Control to the Learners: The Role of the Internet in Promoting a More Autonomous View of Learning	Ayse Yumuk; Bilkent University; Turkey	Paper	Bilkent University	105
Thur	10:30 AM	Lecture Theatre 8	A	Microsoft Teacher Training Grant Support: History of A Long Term Commitment to a State University Teacher Education Program	M C Ware; SUNY -- Cortland; USA	Paper	SUNY -- Cortland	246
Thur	10:30 AM	Lecture Theatre 8	B	Project Management as a Development Tool: A Case Study in Cooperative Materials Development for a Web-Based Programme	Lou van Wyk, Elize Goosen; Potchefstroom University; South Africa	Paper	Potchefstroom University	262
Thur	10:30 AM	Lecture Theatre 9	B	Streaming Video Solutions for Distance Education	Jerald D. Cole; New York Institute of Technology; USA	Paper	New York Institute of Technology	118
Thur	10:30 AM	Lecture Theatre 10	A	Virtual Education Network (VEN)	Gerda Kysela-Schiemer; Donau University Krems; Austria	Paper	Donau University Krems	143
Thur	10:30	Lecture	B	Using Electronic Means to	Lynae Sakshaug; SUNY	Paper	SUNY Brockport	150

	AM	Theatre 10		Enhance Discourse, to Engage Learners, and to Build Community in an Integrated Methods Course for Elementary Preservice Teachers	Brockport; USA			
Thur	10:30 AM	Lecture Theatre 11	A	Exhibitor Presentation	--	Exhibitor Presentation		
Thur	10:30 AM	Lecture Theatre 11	B	Exhibitor Presentation	--	Exhibitor Presentation		
Thur	10:30 AM	Crossroads Cafe		Network Printing in a College of Education: Cost Savings and Reduced Support	Dane Hughes, John Gretes; University of North Caroline at Charlotte; USA	Poster	Universitry of North Carolina at Charlotte	169
Thur	11:30 AM	Crossroads Cafe	A	Classroom-based Publishing Using the Internet	Maureen Labrum; Chapbooks.com; USA	Poster	Chapbooks.com	106
Thur	11:30 AM	Lecture Theatre 1	A	Computer Literacy Program: Its effect on the Self-Concept of the Disabled Students in the University of the East, Caloocan City	Rebecca Purpura-Go; University of the East; Philippines	Paper	University of the East	109
Thur	11:30 AM	Lecture Theatre 1	B	Curriculum Planning in the 21st Century: Managing Technology, Diversity, and Constructivism to Create Appropriate Learning Environment for All Students	Walter S Polka, P. Rudy Mattai; Lewiston-Porter Central School District; USA	Paper	Lewiston-Porter Central School District	123
Thur	11:30 AM	Lecture Theatre 2	A	Brazilian Software Needs for Multimedia Mathematical Learning	Rosana Giaretta Sguerra Miskulin, Jnoi de Almeida AMorim; State University of Campias -- UNICAMP; Brazil	Paper	State University of Campias -- UNICAMP	238
Thur	11:30 AM	Lecture Theatre 2	B	Using Teaching and Learning Standards to Evaluate Software	Joanne Caniglia; Eastern M ichigan University; USA	Paper	Eastern M ichigan University	248
Thur	11:30 AM	Lecture Theatre 3	A	Preparing Teachers to Use and Integrate Technology in the Elementary Education Curriculum	Barbara J Levine; Robert Morris College; USA	Paper	Robert Morris College	212

Thur	11:30 AM	Lecture Theatre 3	B	Technology-based Learning: Using web Authoring Tools to Enhance Instruction in the Classroom	Ken Neo, Mai Neo; Multimedia University; Malaysia	Paper	Multimedia University	104
Thur	11:30 AM	Lecture Theatre 4	A	From Animated PowerPoint to VIdeotape: Addressing Problems of Student Access by Separating the Media of Development and Delivery	Jennie Swann; University of the South Pacific; Fiji	Paper	University of the South Pacific	119
Thur	11:30 AM	Lecture Theatre 4	B	The Plus Program: A Hybrid On-Line / Conventional Classroom Approach	Michael Nelson; International College -- CIT; USA	Paper	International College -- CIT	121
Thur	11:30 AM	Lecture Theatre 5	A	Digital Portfolios: The Plan, The Purpose, A Preview	Val Christensen, Terry Corwin; Valley City State University; USA	Paper	Valley City State University	165
Thur	11:30 AM	Lecture Theatre 5	B	Web Accessibility of Community Colleges' Web Pages	Marty Bray; University of North Carolina at Charlotte; USA	Paper	University of North Carolina at Charlotte	207
Thur	11:30 AM	Lecture Theatre 6	A	A System Design for the Implementation of a Virtual Campus	Andres Nunez; Florida State University; USA	Paper	Florida State University	210
Thur	11:30 AM	Lecture Theatre 6	B	Implementation of an e-Learning Strategy within a UK Higher Education Institution	Liz Smith, Keith Lawrence; University of Salford; United Kingdom	Paper	University of Salford	236
Thur	11:30 AM	Lecture Theatre 7	A	Taking the Distance out of Distance Learning	Felicia Ryerson; The Florida Online High School; USA	Workshop	The Florida Online High School	202
Thur	11:30 AM	Lecture Theatre 7	B	Teacher Training and Instructional Technology: An Example and Assessment	David H. Gray; United States Foreign Service; USA	Paper	United States Foreign Service	110
Thur	11:30 AM	Lecture Theatre 8	A	The New Apprenticeship	Jason M Johnston; Delphi Corporation; USA	Paper	Delphi Corporation	274
Thur	11:30 AM	Lecture Theatre 8	B	Corporate E-Learning: Trends And Issues	Andres Nunez; Florida State University; USA	Paper	Florida State University	209
Thur	11:30 AM	Lecture Theatre 9	A	Writing Curriculum for the Online Classroom	Diana Muir; Hawking Institute; USA	Paper	Hawking Institute	124

Thur	11:30 AM	Lecture Theatre 9	B	Access to Technology at Woodbury University -- the Aftermath	Robert A Schultz; Woodbury University; USA	Paper	Woodbury University	158
Thur	11:30 AM	Lecture Theatre 10	A	A Study of Critical Learning Incidents in Both a Traditional Classroom and an Asynchronous Learning Network	Gary Sarkozi; Virginia Commonwealth University; USA	Paper	Virginia Commonwealth University	151
Thur	11:30 AM	Lecture Theatre 10	B	An Advance Organizer Approach to Distance Learning Course Presentation	John W Coffey, Alberto Canas; University of West Florida; USA	Paper	University of West Florida	153
Thur	11:30 AM	Lecture Theatre 11	A	Exhibitor Presentation	--	Exhibitor Presentation		
Thur	11:30 AM	Lecture Theatre 11	B	Exhibitor Presentation	--	Exhibitor Presentation		
Thur	11:30 AM	Crossroads Cafe		Of Online Passports, Portfolios and Lesson Plans: The Story of a Special Education Class and Their Student Teacher	Marty Bray; University of North Carolina at Charlotte; USA	Poster	University of North Carolina at Charlotte	208
Thur	12:30 PM	Crossroads Cafe		Light lunches available at Crossroads Cafe, Oglesby Student Center	--	Lunch		
Thur	12:30 PM	Crossroads Cafe		Concept and Implementation of the First Virtual University in Yugoslavia	Velijko Spasic; University of Belgrade; Yugoslavia	Lunch / Presentation	University of Belgrade	194
Thur	1:30 PM	Lecture Theatre 1	A	SCIFAIR.ORG, A Web Based Resource for Elementary to Graduate School	John W Gudenas; Aurora University; USA	Paper	Aurora University	131
Thur	1:30 PM	Lecture Theatre 1	B	Knowledge-based Design	Walter Wager; Florida State University; USA	Paper	Florida State University	133
Thur	1:30 PM	Lecture Theatre 2	A	When All The Quick Fixes Fail, Try R & D	Robert K Branson; Florida State University; USA	Paper	Florida State University	257
Thur	1:30 PM	Lecture Theatre 2	B	Thinking Through A Teaching / Training Website	Phil Grise; Florida State University; USA	Paper	Florida State University	273
Thur	1:30	Lecture	A	Evaluating E-Learning in a	Petra van Heugten, Wim	Paper	International	125

	PM	Theatre 3		Traditional Teaching Environment – Part 1	Oostindier; International Business School, University of Professional Education; Netherlands		Business School, University of Professional Education	
Thur	1:30 PM	Lecture Theatre 3	B	Evaluating E-Learning in a Traditional Teaching Environment – Part 2	Petra van Heugten, Wim Oostindier; International Business School, University of Professional Education; Netherlands	Paper	International Business School, University of Professional Education	276
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Thur	1:30 PM	Lecture Theatre 4	B	Faculty Going the Distance: Motivations, Incentives, and Satisfaction in the Florida Community College System	Beverly L Bower, Akahito Kamata; Florida State University; USA	Paper	Florida State University	141
Thur	1:30 PM	Lecture Theatre 5	B	The Match Game: Putting Learners and Software Together	Sara Hagen; Florida State University; USA	Paper	Florida State University	213
Thur	1:30 PM	Lecture Theatre 6	A	UNITAR's Virtual Online Instructional Support System (VOISS): Success and Failure	Normaziah Che Musa; Universiti Tun Abdul Razak (UNITAR); Malaysia	Paper	Universiti Tun Abdul Razak (UNITAR)	251
Thur	1:30 PM	Lecture Theatre 6	B	A Technology-Rich Teacher Preparation Program	Constance J Pollard, Carolyn Thorsen; Boise State University; USA	paper	Boise State University	137
Thur	1:30 PM	Lecture Theatre 7	A	Building Assessment Mechanism into Educational Technology and Curriculum Integration	Robert Zheng, Barbara Wilmes; Marian College; USA	Paper	Marian College	120
Thur	1:30 PM	Lecture Theatre 7	B	A Collaborative Model of Integrating Technology K-16	Margaret M Boice; Trinity College; USA	paper	Trinity College	136
Thur	1:30 PM	Lecture Theatre 8	A	Managing the Mandate: Distance Education in Teacher Education – Why and How Mainstream Faculty Should Become Distance Educators	Michael Simonson, Nova Southeastern University; USA Judith A Converso; Florida State University; USA	Paper	Florida State University	203

Thur	1:30 PM	Lecture Theatre 8	B	Large-Scale Education Reform: Systemic Approach Acknowledging Change Leadership Principles and Design	Judith A Converso, Florida State University; USA Michael Simonson, Nova Southeastern University, USA	Paper	Florida State University	204
Thur	1:30 PM	Lecture Theatre 9	A	The "T-CLES": Assessing Technology Utilization in Classrooms from a Constructivist Perspective	Robert McClure; Saint Mary's University; USA	Paper	Saint Mary's University	127
Thur	1:30 PM	Lecture Theatre 9	B	Automatic Characterization of Computer Programming Assignments for Style and Documentation	Dulal C Karr; Texas A & M University -- Corpus Christi; USA	Paper	Texas A & M University -- Corpus Christi	130
Thur	1:30 PM	Lecture Theatre 10	A	Transition to Teaching: A Web Based Alternative Model	Glenn Thomas, Eileen McDaniel, Loraine Wood, Fanchon Funk	Paper	Florida State University	278
Thur	1:30 PM	Lecture Theatre 10	B	Challenges of Alternative Teacher Certification: Pilot Program in Broward County, Florida	Marcia Beckford, Charles Venin, Connie Gaede; Broward County Schools, USA	Paper	Broward County Schools	279
Thur	1:30 PM	Crossroads Cafe		Training Today's Teachers for Tomorrow's Classrooms	Mark Warner; Augusta State University; USA	Panel	Augusta State University	122
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Thur	1:30 PM	Lecture Theatre 11	B	Exhibitor Presentation	--	Exhibitor Presentation		
Thur	1:30 PM	Crossroads Cafe		Part-time Distance Learning Master's Degree Program in Speech-Language Pathology	Howard Goldstein, Linda Gessner; Florida State University; USA	Poster	Florida State University	231
Thur	2:30 PM	Oglesby Ballroom		Plenary	Larry Wilson	Plenary		
Thur	3:30 PM	Oglesby Student Union		School Visits		School Visits		
Thur	7:00 PM	University Center Club		Informal Reception / Dinner		Informal Dinner		
Fri	8:00 AM	Lecture Theatre 1	A	Sustaining Technician Education in the Age of	Andrea Bagares-Mangundayao, Selfa Java-	Paper	Technological University of the	108

				Globalization	Briones; Technological University of the Philippines; Philippines; John Dequito Mefragata, Concordia College		Philippines; Concordia College	
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Fri	8:00 AM	Lecture Theatre 2	A	Design and Develop Web-Based Training: An Internet Course	M Beatriz Beltran; United Bible Societies; USA	Paper	United Bible Societies	159
Fri	8:00 AM	Lecture Theatre 2	B	The Napster Revolution on College Campuses: How Universities and The Recording Industry are Coping with the music File-Sharing Sensation	Thomas Hutchison; Middle Tennessee State University; USA	Paper	Middle Tennessee State University	163
Fri	8:00 AM	Lecture Theatre 3	A	Overcoming the "Technology Lag" Among Higher Education Faculty: Introduction, Production, Maintenance, and Evaluation Services to Increase Technology-Enabled Instruction	Don L Martin; North Carolina State University; USA	Paper	North Carolina State University	132
Fri	8:00 AM	Lecture Theatre 3	B	Wellness Profile and Attitude Towards Information Technology in Sports: Implications to Athletic Performance	Luzviminda S Macalimbon; University of the East, Caloocan; Philippines	Paper	University of the East, Caloocan	142
Fri	8:00 AM	Lecture Theatre 4	A	Abolishing the Separation of Chalk and Stage: Maximizing Multimedia in Distance Learning	John Tolsma; Erroyo; USA	Paper	Erroyo	154
Fri	8:00 AM	Lecture Theatre 4	B	An Investigation of Student Perceptions of Instructional Strategies Used in Synchronous Learning Environments	Malanie Greene, Sara Olin Zimmerman; Appalachian State University; USA	Paper	Appalachian State University	157
Fri	8:00 AM	Lecture Theatre 5	A	ODL System for Engineering Postgraduate Studies	Jolanta Chee; National Institute of Telecommunications;	Paper	National Institute of Telecommunications	174

					Poland			
Fri	8:00 AM	Lecture Theatre 5	B	So Many Toys; So Little Time	H Dale Nute, Thomas B Kelley, C Ray Jeffrey; Florida State University; USA	Paper	Florida State University	177
Fri	8:00 AM	Lecture Theatre 6		ALO/USAID Project	Owen Gaede, Lou van Wyk, Robert Morgan, Elize Goosen; Learning Systems Institute / Florida State University; USA	Paper	Learning Systems Institute / Florida State University	275
Fri	8:00 AM	Lecture Theatre 7	A	Models for Pre- and Inservice Instructional Technology (IT) Training at the University of Pittsburgh at Johnstown (UPJ)	Bernard John Poole; University of Pittsburgh at Johnstown; USA	Paper	University of Pittsburgh at Johnstown	138
Fri	8:00 AM	Lecture Theatre 7	B	Collaborative Technology-Rich Field Experiences	Teresa Delgado Harrison; Boise State University; USA	Paper	Boise State University	139
Fri	8:00 AM	Lecture Theatre 8	A	University Cooperation with Neighborhood Organizations: Project Management Technology Education in Urban Neighborhood Redevelopment	John M Gleason, James T Ault; Creighton University; USA	Paper	Creighton University	201
Fri	8:00 AM	Lecture Theatre 8	B	Empire State Partnership Project: An Arts Connection with a Focus on Improving Learning via Technology	Walter S Polka; Lewiston-Porter Central School District; USA	Paper	Lewiston-Porter Central School District	115
Fri	8:00 AM	Lecture Theatre 9		Developing Multimedia Rich Web Resources	Joseph C. Roach; Florida A & M University; USA	PC Lab	Florida A & M University	214
Fri	8:00 AM	Lecture Theatre 10		Redesigning the Classroom: Technology and Teaching	Linda M Best; Edinboro University PA; USA	Workshop	Edinboro University PA	247
Fri	8:00 AM	Lecture Theatre 11	A	Global Access to Distance Education -- Barriers and Inequalities	Andrew A. Sorensen, President, University of Alabama	Paper	University of Alabama	
Fri	8:00 AM	Crossroads Cafe		The Teaching and Learning Triangle	T M Malie, Q M Sello; University of Botswana; Botswana, Southern Africa	Poster	University of Botswana	255

Fri	9:00 AM	Oglesby Ballroom		Digital Nations at M.I.T. Media Lab	Eleonora Badilla	Plenary	Massachusetts Institute of Technology	
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Fri	10:30 AM	Crossroads Cafe		Two Models of Website Pedagogy: Theory and Applications	Donald B Egolf, Ellen R Cohn; University of Pittsburgh; USA	Panel	University of Pittsburgh	162
Fri	10:30 AM	Lecture Theatre 1	A	Identifying Standards for Online Education Service Providers	Claire Campbell; Southern Cross University; Australia	Paper	Southern Cross University	178
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Fri	10:30 AM	Lecture Theatre 2	A	DataCounts.net	Peter Lenkway, Carolyn Peterson; Tallahassee Community College; USA	Paper	Tallahassee Community College	184
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Fri	10:30 AM	Lecture Theatre 4	A	Integrating Computer and Communication Technologies in Distance Courses: An Experience	Adriana Claudia Fantini; Universidad Nacional De La Patagonia; Argentina	Paper	Universidad Nacional De La Patagonia	180
Fri	10:30 AM	Lecture Theatre 4	B	Interactivity in Web-Based Learning	Kathleen Burnett; Florida State University; USA	paper	Florida State University	181
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Fri	10:30	Lecture	B	Pinnacles and Pitfalls of	Bonnie H Armstrong;	Paper	Florida State	188

	AM	Theatre 5		Web-Based Courses	Florida State University; USA		University	
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Fri	10:30 AM	Lecture Theatre 6	B	Using Learning Technology to Increase Matric Exemption Rates Among Disadvantaged Students	Lou Van Wyk, Owen Gaede, Elize Goosen, Robert Morgan; University of Potchefstroom, South Africa; Florida State University, USA	Paper	University of Potchefstroom	280
Fri	10:30 AM	Lecture Theatre 7		Teacher Training, Computers and Related Technologies: Challenges and Strategies	Devon Duhaney; State University of New York at New Paltz; USA	RoundTable	State University of New York at New Paltz	129
Fri	10:30 AM	Lecture Theatre 8		Research Driven: An Effective Technology Learning Model for Preservice Teachers	Diane L Judd; Valdosta State University; USA	RoundTable	Valdosta State University	147
Fri	10:30 AM	Lecture Theatre 9	A	Evaluating the Beacon Learning Center	Kenneth L Shaw, Cathie Herzog, Lindsay Gotshall, Cathie Herzog, Lindsay Gotshall, Catherine M Pomar; Florida State University; USA	Paper	Florida State University	126
Fri	10:30 AM	Lecture Theatre 9	B	The Usage of Internet to Develop Industry & Two Year College Co-operation and Practices of a Project in Turkey	Sabahattin Balci, Ryza Gurbuz; Ankara University; Turkey	Paper	Ankara University	160
Fri	10:30 AM	Lecture Theatre 10	A	Showcasing New Teachers: Electronic Portfolios	Richard R Pollard; University of Idaho; USA	Paper	University of Idaho	140
Fri	10:30 AM	Lecture Theatre 10	B	Faculty Training and Utilization of Technology in Preservice Education	Richard M Johnson; Boise State University; USA	Paper	Boise State University	145
Fri	10:30 AM	Lecture Theatre 11	A	A Hybrid Model of Distance Learning in Peace and Conflict Studies	Hongyang Yang; Nova Southeastern University; USA	Paper	Southeastern University	272
Fri	11:30 AM	Lecture Theatre 1	A	Intercons -- Adaptive Internet Based	Velijko Spasic; University of Belgrade; Yugoslavia	Paper	University of Belgrade	195

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Fri	11:30 AM	Lecture Theatre 1	B	The Introduction of Web-Based Instruction into the Undergraduate STEM Curricula at Florida A & M University	Cheryl Seay, Dhyana Ziegler, Reginald J. Perry; Florida A & M University; USA	Paper	Florida A & M University	206
Fri	11:30 AM	Lecture Theatre 2	A	On-Demand Lectures Using Streaming Media	Curt Westbrook; California State University -- San Bernardino; USA	Paper	California State University -- San Bernardino	216
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Fri	11:30 AM	Lecture Theatre 3	A	Faculty Adoption of the Campus Intranet System for Posting Grades: A Diffusion Study	Kathy Keltner, Thomas Hutchinson; Middle Tennessee State University; USA	Paper	Middle Tennessee State University	164
Fri	11:30 AM	Lecture Theatre 3	B	Meet "Carla": Software for Assessing Oral Student Responses	Janet Flewelling, Donald Snider; University of Windsor; Canada	Paper	University of Windsor	166
Fri	11:30 AM	Lecture Theatre 4	A	Mentoring Online	Kijana Crawford; Rochester Institute of Technology; USA	Paper	Rochester Institute of Technology	193
Fri	11:30 AM	Lecture Theatre 4	B	Student Perception of Community in an Online Learning Environment	Rita-Marie Conrad; Florida State University; USA	Paper	Florida State University	197
Fri	11:30 AM	Lecture Theatre 5	A	Oh, What A Web We Weave	Jo Anne Larsen, Sally Szydlo; University of South Florida; USA	Paper	University of South Florida	200
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Fri	11:30 AM	Lecture Theatre 6	A	Project CATALISE: A New U. S. Teacher Education Technology Initiative	Richard J O'Connor; University of Arkansas at Monticello; USA	Paper	University of Arkansas at Monticello	146
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Fri	7:00 PM			Banquet Speaker	William Montford Leon County, Florida Superintendent of Schools; President, Florida Assn. of District School Superintendents			
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Sat	8:00 AM	Lecture Theatre 3	A	A Learning Centered Approach to Coursework & Teaching Evaluation: A Multi-Method Evaluation of Instruction in Education Classes	Robert Algozzine, John Gretes; Universitry of North Caroline at Charlotte; USA	Paper	Universitry of North Caroline at Charlotte	167
Sat	8:00 AM	Lecture Theatre 3	B	Technology Resources in Support of Teaching	Ann-Charlotte Markman; Rosjoskolan School; Sweden	Paper	Rosjoskolan School	171
Sat	8:00 AM	Lecture Theatre 4	A	A Learning Centered Approach to Coursework & Teaching Evaluation: A Multi-Method Evaluation of Instruction in Engineering Classes	Ganesh P Mohanty; University of North Carolina at Charlotte; USA	Paper	University of North Carolina at Charlotte	173
Sat	8:00 AM	Lecture Theatre 4	B	Using XML and XSL To Produce and Maintain Courses on the Web	Marc Nanard, Karine Binaciotto; Conservatoire National Des Arts et Metiers; France	Paper	Conservatoire National Des Arts et Metiers	176
Sat	8:00 AM	Lecture Theatre 5	A	Examining Students' and Teachers' Perceptions of Microcomputer Based Laboratories (MBL's) in High School Chemistry	Hakan Yavuz Atar; Florida State University; USA	Paper	Florida State University	182

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Sat	8:00 AM	Lecture Theatre 5	B	An Internet Mediated E-Learning Resource Providing On-Line Real-Time Tests To Prepare Students for Scholastic Evaluation Exams	Syed Sibte Raza Abidi; Universiti Sains Malaysia; Malaysia	Paper	Universiti Sains Malaysia	185
Sat	8:00 AM	Lecture Theatre 6	A	Supporting Mathematics and Science Teachers through Technology	Hakan Yavuz Atar, Chris Muire; Florida State University; USA	Paper	Florida State University	187
Sat	8:00 AM	Lecture Theatre 6	B	Supporting Internet Based Courses With Microsoft Front Page	Robert Workman; Southern Connecticut State University; USA	Paper	Southern Connecticut State University	190
Sat	8:00 AM	Lecture Theatre 7	A	Use of Web-based 3-D Technology for Learning Assembly Skills	William A Kealy; Univrsity of South Florida; USA	Paper	University of South Florida	220
Sat	8:00 AM	Lecture Theatre 7	B	Project SL-IDE (Speech Language-Interactive Distance Education): Utilization of Multi-Component Technology	Juliann Woods, Linda Gessner; Florida State University; USA	Paper	Florida State University	230
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Sat	8:00 AM	Lecture Theatre 8	B	Potential of Distance Education for Lessening the Brain Drain in Slovakia and Central and Eastern Europe	Katarina Pisutova; Open Society Foundation; Slovak Republic	paper	Open Society Foundation	232
Sat	8:00 AM	Lecture Theatre 9	A	Learning, Robotics, and Culture: A Proposal for Rural Development	Claudia Urrea; MIT -- Media Lab; USA	Paper	MIT -- Media Lab	241
Sat	8:00 AM	Lecture Theatre 9	B	Strategies to Incorporate Active Learning into Online Teaching	Diane Austin, Nadine D. Mescia; University of South Florida; USA	Paper	University of South Florida	245
Sat	8:00 AM	Lecture Theatre 10	A	Integrated Cooperative Models and Cognitive Flexibility Strategies for Career Guidance	Idalia Sa-Chaves; University of Aveiro; Portugal	Paper	University of Aveiro	172
Sat	8:00	Lecture	B	The Pedagogical ICT-	Ulla Gjoerling, Ojvind	Paper	The Danish	175

	AM	Theatre 10		driver's Licenses: A Danish National Initiative to Raise Teacher's ICT Competencies	Brogger; The Danish Computer Centre for Research and Education; Denmark		Computer Centre for Research and Education	
Sat	9:00 AM	Lecture Theatre 1	A	Web World Wonders -- Field Work Gone Virtual: Quality Content Using Multiple Technologies for K-12 Education	Laurie E. S. Molina; Florida State University; USA	Paper	Florida State University	219
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Sat	9:00 AM	Lecture Theatre 3	B	How ICT in the Classroom Can Offer Diversity for Preferred Learning Styles	Susan Jane Waite; University of Plymouth; United Kingdom	Paper	University of Plymouth	239
Sat	9:00 AM	Lecture Theatre 4	A	Students Creating Community	Elisabeth Logan; Florida State University; USA	Paper	Florida State University	253
Sat	9:00 AM	Lecture Theatre 4	B	Concept Map-Based versus Web Page-Based Interfaces in Search and Browsing	Mary Jo Carnot; University of West Florida; USA	Paper	University of West Florida	259
Sat	9:00 AM	Lecture Theatre 5	A	The Mentor Role In Online Teaching and Learning	Carole Hayes; Florida State University; USA	Paper	Florida State University	264
Sat	9:00 AM	Lecture Theatre 5	B	Empirical Evaluation of a Forecasting Model for Successful Facilitation on Telematic Learning Programmes	Antoinette Bischoff; Potchefstroom University; South Africa	Paper	Potchefstroom University	267
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	AM	Theatre 6		Disciplinary Distance Learning	Smith, M J Edwards, P O Murdock, M K Mathis, M L Beard; Middle Tennessee State University; USA		State University	
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Sat	9:00 AM	Lecture Theatre 8	A	Building Web Sites To Enhance Computer Literacy And Curriculum Development	Ed Antosz; University of Windsor; Canada	Paper	University of Windsor	198
Sat	9:00 AM	Lecture Theatre 8	B	Collaborative Learning through the Problem Solving Design in the Computational Environment -- E-Team	Rosana Giaretta Sguerra Miskulin; State University of Campias -- UNICAMP; Brazil	Paper	State University of Campias -- UNICAMP	199
Sat	9:00 AM	Lecture Theatre 9	A	Faculty Development at Florida State University	Andres Nunez; Florida State University; USA	Paper	Florida State University	211
Sat	9:00 AM	Lecture Theatre 9	B	Aspects of Self-Perceived Computer Competence and Its Predictors Among University Students	Johan Van Braak, Katie Goeman; Vrije University Brussel; Belgium	Paper	Vrije University Brussel	215
Sat	10:00 AM	Crossroads Cafe	B	Making Technology Effective in Learning	Robert Kohser; Dixie High School; USA	Panel	Dixie High School	268
Sat	10:00 AM	Lecture Theatre 1	A	Digital Portfolio	Ann Lindvall; Rosjoskolan; Sweden	Paper	Rosjoskolan	243
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Sat	10:00 AM	Lecture Theatre 2	A	The Web as an Effective Tool for Knowledge Development: A Case Example of Potential Innovations in Research Methodology	Jeff Lacasse, Scott Ryan, Tomi Gomory; Florida State University; USA	Paper	Florida State University	263

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Sat	10:00 AM	Lecture Theatre 4	A	Technology in the Classrooms: New Design for Learning	Gerald W. Burgess; Albany State University; USA	Paper	Albany State University	217
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Sat	10:00 AM	Lecture Theatre 7	A	Implementing JAVA Beans, CORBA, and JDBC in the Development of a Web-Based Environment	Mohammed Samaka; UAE University; UAE	Paper	UAE University	117
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